Master's Thesis

The Relevance Between Autonomous Level For Personal Indoor Farming And Emotion Bonding According To Pre-Experiences

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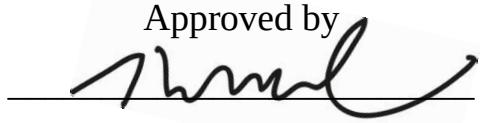

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ABSTRACT

As more people live in the cities, the distance between people and our food source is getting farther and there are many innovative solutions to grow food within city life spaces. According to preliminary interview with 30 people, it was found that the fact is assumable that people care their plants forming an emotional bonding on their plants or activities itself. On the other hand, many existing solutions are tuned in the technological specifications and it is lack of user study on the personal indoor farming type of product.

Along with this context, this project was initiated from a question "Would the more autonomous system be always better for the users?". As a result, this study aims to answer the following research questions: 1) How does emotional bonding of users differs with regard to the different levels of PIF autonomy? 2) How does the different level of experience in PIF influence emotional bonding of users and products with regard to the different levels of PIF autonomy? 3) What is the direction that PIF should be aiming for in terms of system autonomy and use experience?

Scenario cards were generated based on the ideation workshop with 12 creators who have background in HCI (Human-Computer Interaction), Interaction Design, Service Design and UX Design. The 4 level of autonomy and 2 degree of expandability was utilized to structure the 8 set of scenarios from the workshop results. 46 participants are recruited to answer for the survey regarding emotional bonding and the potential determinants under 12 questions. Among 46 participants, 22 people were recruited for experienced group and 23 people were in-experienced group. The one sample was ejected because of low validity. For all questions, people were asked to answer the 12 questions according to 5 Likert scale and choose the best and worst scenario they are willing to use. Also after survey, people were asked to talk about the reason for choosing the best and worst scenarios.

As a result, there was a certain pattern was found that scenarios with level 0 and 2 shows high emotional bonding regardless of expandability. Also, the pattern of emotional bonding score did not show difference on the groups. For the potential determinants of emotional bonding, there was difference between the experienced and the inexperienced and that is: Experienced people more related their *memories* in the emotional bonding in personal indoor farming. These findings are expected to help the target segmentation for personal indoor farming products and determine the product specifications. Limitations are also discussed at the end with recommendation to a further study.

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ACRONYMS

PIF	Personal Indoor Farming
ALFUS	Autonomous Level For Unmanned System
	Emotional Bonding
PFC	Personal Food Computer
HI	Human Independency
ALFPIF	Autonomous Level For Personal Indoor Farming
PVF	Personal Vertical Farming

1. Introduction

1.1 BACKGROUND

Click and Grow, a personal indoor farming appliance venture company, is popular in Europe and America and known to raise sales on tens of thousands of their product, named herb garden annually. Personal Indoor Farming (PIF) in this paper follows definition that is: A form of growing *food* home for a trusted, fun way to access fresh, healthy food. (Gabe Blanchet, 2016) Raising food within their space for themselves human is what have been done throughout history and it is going back to its origin: Local food movement is one of the evidence. Looking more in depth, there are many solutions to bring farming closer to our city life such as the boom in vertical farming recently within a decade. On the other hand, while some of countries such as Japan are known to have high average level of knowledge and skills between ordinary citizens, most of city people in other countries are not farmers as you might know and still it means there is a gap for personal indoor farming to overcome and go forward to future city life.

Before diving into questioning how to frame the research, I interviewed 30 people who are already doing personal indoor farming or have done it as a preliminary and exploratory research. Each person had own reason to do farming and different background in doing personal farming. There was one critical observation among the insights from the 30 people. Quite many of people endowed meaning to their personal indoor farming and seemed to build some kind of emotional bonding on itself the actions or the plants. One of interviewees answered that he is no more doing indoor farming after one big shock from the bugs' attacking in veranda which led his veranda garden plants all dead. He described those plants as if they were a kind of pets or the things to share emotions with his efforts put for it. Another interviewee shared his story that he started indoor farming for his young daughter to do with and it became one of the daily routine family activity to water, plant and juice the grown kale leaves to drink in the morning. He emphasized the emotionally relieving effect and also meaning to himself and his family.

According to a research by Guido Jansen under the title of 'Attitudes Towards Vertical Farming at Home: A User Study', the researchers actually interviewed people regarding their experience with the closed type of personal indoor farming product and recorded people's reaction on it. The product has partially automated system. Regarding the product, some people showed positive attitude in terms of its easiness by automation and some other showed negative

emotion showing empathetic attitude on the plants saying that the plants seems poor locked within the small box.

One study related to emotional bonding to personalized product suggests a conceptual model regarding the efforts put to the product and the relationship with emotional bond as a result. (Ruth Mugge, 2009) The concept brings an issue that how much efforts to put may matter for the emotional bonding. Along with the context, basically Personal Indoor Farming is an activity that people inevitably put efforts or caring on the plants. That might be why people doing PIF mention their emotional experiences as the more plants grow well, the more people have put efforts on it and get rewarded.

1.2 ISSUE RAISING: LEVEL OF AUTONOMOUS AND EMOTIONAL BONDING

As mentioned above, not every people living in the cities are not good in personal indoor farming. The reasons might be for some people it is because they do not have enough skills and knowledge on it or for another it is because they do not have enough time to observe the slowly growing little green. While one of the innovative solutions for this is to have an intelligent and autonomous system, there is one doubt on whether people would actually love to be helped by devices or system as quite many of people showed emotional feedbacks on their personal indoor farming experiences. Also according to the study of Ruth Mugge, while efforts invested can influence emotional bonding, the autonomy is what make people to put less efforts on their plants.

1.3 RESEARCH AIM AND RESEARCH QUESTIONS

Like this along with the context, I found a dilemma between the relationship of the convenience technology and people's emotional experiences for more emotional bonding. Those two elements are both considered to be one of the quite marketable elements and there seems to be meaning to find scientific and credible relevance between the autonomous system and emotional bonding. To solve this dilemma, this research is to answer for the three research questions as follows.

The first is **How does emotional bonding of users differs with regard to the different levels of PIF autonomy?** It is a question about the relevance of experience on emotional bonding on

different autonomy. Would people love their plants to be cared by system or for themselves to do everything?

The second research question is **How does the different level of experience in PIF influence emotional bonding of users and products with regard to the different levels of PIF autonomy?** Would in-experience love to be cared fully because of their lack of skills and knowledge? Would experienced group of people love to do everything by themselves rather disturbed by the too much assists?

The last question is **What is the direction that PIF should be aiming for in terms of system autonomy and use experience?** It aims to raise meaningful design implications that can be reference in framing users in designing personal indoor farming product or system.

1.4 RESEARCH DESIGN

The core part of this research is in the autonomous level of personal indoor farming and it was found in early stage of research that the virtual medium for the autonomous level is necessary. As a result in this project, scenarios were generated and utilized to examine virtual circumstances. Today there are not enough study is found on the autonomous level of personal indoor farming so workshops were preceded to generate scenarios and the conceptual model for the autonomous level of personal indoor farming, After they generated, the sets of scenarios are evaluated in terms of emotional bonding and the determinants of emotional bonding by potential users in two groups that one is experienced and the other is in-experienced group.

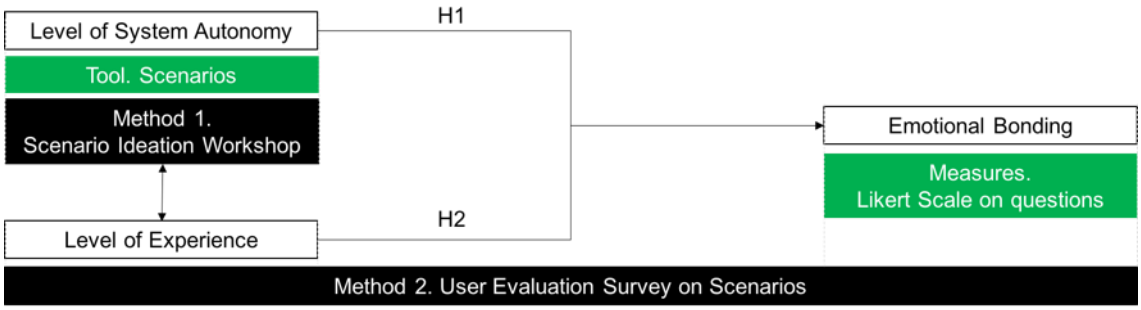

Figure 1. Research Design Diagram

2. THEORETICAL FRAMEWORK

2.1 PERSONAL INDOOR FAMING (PIF)

2.1.1 Product System Elements

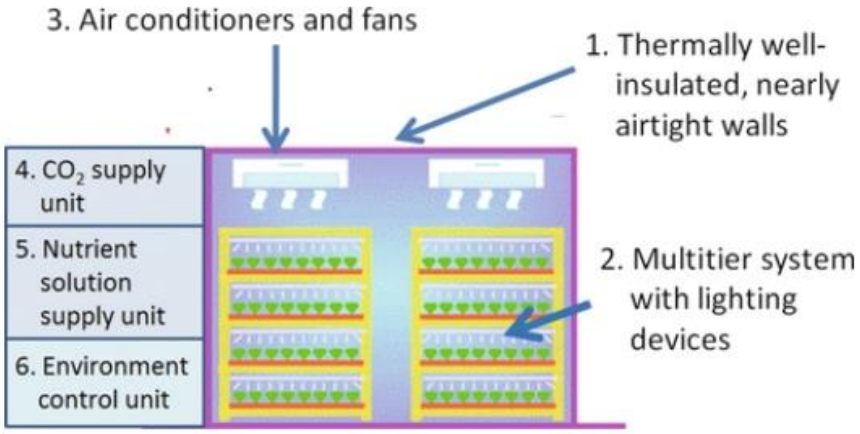

Figure 2. Configuration example of plant factory (Kozai T. Nju, 2015)

Click and Grow, a personal indoor farming appliance venture company, is popular in Europe and America and known to raise sales on tens of thousands of their product, named herb garden annually. Personal Indoor Farming (PIF) in this paper follows definition that is: A form of growing *food* home for a trusted, fun way to access fresh, healthy food. (Gabe Blanchet, 2016) Raising food within their space for themselves human is what have been done throughout history and it is going back to its origin: Local food movement is one of the evidence. Looking more

2.1.2 Autonomous Farming (Agriculture) In Big Scale

As there are not enough academic frameworks or sources for defining the autonomous system of PIF, the autonomous system from big scale is reviewed. There are big 3 concepts and mechanisms for farming stages. (B.S. Blackmore, 2006) The farming stage consists of establishment, crop care and harvesting. For the first stage establishment, there are things to be done such as seed bed preparation, seed mapping, seed placement, reseeding and etc. For crop care, there are crop scouting, weed mapping, physical weed methods, micro spraying and

robotic irrigation. For the last stage harvesting, there are selective harvesting, static threshing and processing, and transportation.

2.1.3 Defining Elements Of Autonomy System For Personal Indoor Farming (ALFPIF).

Figure 3. 7 Essence of Personal Indoor Farming

Out of the stages, concepts and mechanisms found through the reviewing the big scale autonomous farming system, the elements of Autonomy System for Personal Indoor Farming can be defined. From the big scale standard, the stage notions were adapted while the crop-care is classified into more detailed and easily recognizable terms. Also on the other hand, as PIF is in the more controlled indoor spatial context, concepts and mechanisms such as weed related ones were excepted from the element. As a result, there are 7 elements narrowed down for the ASFPIF like the following and expected user issues are added referred from the preliminary interview.

The first step in PIF is planting seeds or seedlings. It is also important to purchase proper seeds and seedlings, and to equip them with the tools necessary for cultivation. In hydroponic cultivation, there are various culture mediums, and it is necessary to select and use it according to the crop. It is also critical to plan and estimate the crop consumption so that the appropriate amount of cultivation. Expected user issues are: How much should you plant to grow the proper amount? How many seeds should be planted in a pot? How much moisture should the seeds keep? What should we plant? How thick should I plant?
Sometimes some of the purchased seeds are also dead. So I usually plant one at a time and not several times at once. However, if the plant is too dense and the crop is planted, it will not grow well.

2.1.3.2 Fertilizing

There are many ways to give enough nutrition. Depending on the type of vegetables such as leafy vegetables, root vegetables, fruit vegetables, etc., nutrients are slightly different, but the nutrients used for hydroponics usually are distributed on the market in the form of powder

diluted or nutrient solution. In the case of nutrients, the recommended total TDS (Dissolved Solid) for each crop is different, requiring a different nutrient concentration for each crop. At too high concentrations, the roots may become necrotic. At too low concentrations, leaves and fruit may become inadequate for ingestion, especially if root vegetables are not well developed. Expected user issues include: How often do you need nutrition? How much do you need? What nutrients should I put in? Do we have to give up nutrients? Could it be that I gave too much or too little? It looks like the roots are a little nasty, is it okay?

2.1.3.3 Air Conditioning

Plants breathe through the leaves. It emits moisture through the pores according to the temperature and also light. While the hydroponics in the room usually shares the indoor air that is suitable for the human, the problem of too low or high the temperature is not that big. However, if the crop is sensitive to temperature, the window-side can be dangerous as it can freeze the water during winter season. For some crops, ventilation is very important, and if they are not well ventilated, they can quickly go away. Carbon dioxide is necessary for plants to do photosynthesis. It is a great help if the users ventilate to help the photosynthesis. Expected user issues are: How much is the proper temperature? Is it okay if I'm in the air-conditioned house? What should I do for ventilation?

2.1.3.4 Irrigation

Because hydroponics exposes roots, the temperature around the roots changes more easily than it grows in the soil. In particular, the temperature of the entire hydroponics system rises and falls rapidly due to air temperature and light intensity, so careful management of the nutrient solution temperature is necessary. Roots are the most important part of plant growth. Healthy plants have white and durable roots. In the Kratky method, the roots follow the water without supplementing the nutrient solution. The rest of the roots exposed above water level absorb the oxygen in contact with the air. So users do not need to add more water and naturally It is much better to leave it in terms of oxygen supply. Some crops are good at high temperature, others are low-temperature crops. Outside this range, nutrients and water absorption capacity will decrease and growth will be inhibited. User issues include: How often should I change water? How often should we give water? How much water is there? Is the temperature of the water moderate?

2.1.3.5 Lighting

Every plant needs light for photosynthesis, and depending on the type of plant, some may live with less light, but most of the time they have enough light. Unlike indoor ornamental plants, especially those grown in garden gardens, growth rates are much faster and require as much light. Each plant has an optical compensation point and a lightning point. When the amount of light is above the light compensation point, the crop begins to grow, and as the light gets stronger, it grows faster and grows stronger. And when it becomes a bandage, it does not get faster even if it is lighted any more. When the amount of light is small, the leaves are small, and the stem becomes thin and becomes a fragile plant. Therefore, if there is a place that can receive direct sunlight for at least several hours, it is better to bring it out and put it in again. And even if you leave it indoors, you'll need to arrange it in parallel to the window with the best sunlight to get a little bit of light. If this effort is insufficient, you need to use artificial light to supplement the light. Modern LED lighting is more efficient than other luminaires, so it can provide the light needed by plants while reducing the cost of electricity. When starting out for the first time, it is a simple solution to use the LED stand at home. Expected user issue includes: How long does the crop needs to be lighted? What is the proper wave length of LED for the crops?

2.1.3.6 Crisis Management

The plants do not always grow up straight and right. The concentration of nutrient solution can be too high to melt the roots, or the light may not be enough to cause over growth. Properly dealing with these problems is also an essential part of indoor personal farming. If you remove over-grown leaves, you can help other small leaves grow bigger. The advantage of hydroponics is that it can be ascertained by lifting the roots, but if the roots are darkened necrotically, you should boldly cut them off and let the new roots grow and grow. The biggest disadvantage of hydroponics is that if the water is contaminated, the pest is spread rapidly through the water and there is a risk of food poisoning. In order to prevent contamination of the water, an oxygen supplier or a silver foil coating for blocking the green algae can be used. Expected user issues are: Why do plants seem to be unhealthy?

2.1.3.7 Harvesting

In order to harvest, it is possible to grow the plant after it is fully grown. Especially in the case of leafage, it is possible to harvest the leaves with leaves that can function as photosynthesis

more than a certain amount. When the new leaves are not long enough, if you cut the big leaves first, you will not be able to receive the nutrients made from the big leaves, so the growth rate will slow down. When cultivated by hydroponics, the growth rate of crops is fast, so small leaves are produced. Leaves that grow to the appropriate size should be cut in time to make a shape and make space so that more leaves can be harvested. If you want to make the stem longer, cut the top growth point and you will not make any more leaves. You can make a male mold according to your environment and your needs, and weighing the harvested crops can be an indicator of your cultivation performance. Expected user issues include: How much can you harvest when you grow up? After harvesting, how long can the plant last? When should crops be removed?

2.1.4 Products In The Market

Information on 16 products was imported through internet shopping mall channels, crowd funding sites, exhibition brochures and so on, among PVF products currently on the market. The product - specific information of 10 items was analyzed in terms of the physical characteristics, system, and price of the product. (Appendix 1)

The physical properties of the product are recorded in terms of the material and color of the product. Synthetic plastic materials are commonly used in the case of materials used, and in the case of parts corresponding to plants or water-bearing basins, there have been cases where they are used as harmless materials such as the material used for the food containers. In the case of color, it was mainly white and 12 out of 16 products utilized white plastic.

The autonomy determinants were recorded, including the installation method, light supply method, seedling or seed planting method, drainage system, culture medium, and power use. Most of installation was easy to place table top, and 13 out of 16 cases using LED light supply timer. In three of these cases, the amount of light can be directly controlled by the user depending on the growth state. In the case of the planting method, it was supplied in the form of a cartridge containing nutrient solution and seed, or a case where the user provided the port parts separately so that the user could assemble the port by himself. Most of the culture medium was sponge type artificial soil. In the case of nutrient supply, eight products are available in liquid or powder-like form in the form of a non-cartridge.

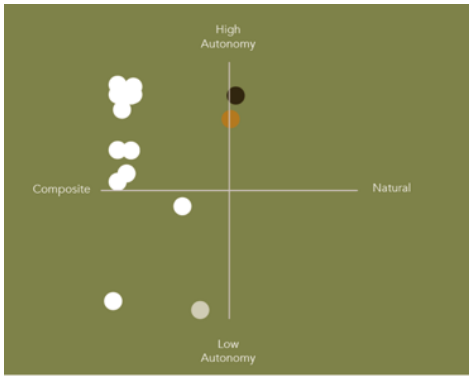

Figure 4. Product Positioning Visualization in terms of material and system autonomy

In the case of price, most of the products are in crowdfunding, but they are based on the retail price on the homepage. For products that do not utilize power, hydroponics products that are cheap at USD 25 are sold at up to USD 4500. The average price of the product was calculated as USD 639.77, and the average was classified into the above average and below the average group. Secondly, the price was divided into 6 groups according to the interval and grouped by the price group.

2.1.5 Future PIF - OpenAg, MIT Media Lab (Personal Food Computer Project)

Figure 5. OpenAG Web Blog Screen Shot, 2018

OpenAg started from MIT builds an ecosystem of food technologies as an open-source community. It aims to create healthier, more engaging and more inventive food systems. As a MIT Open Media Lab project, OpenAg has a mission to create more farmers in terms of the future of food production. Not only developing the open source hardware which is called as

PFC (Personal Food Computer), they are running software platforms to controll hydroponic and aeroponics systems.

2.2 LEVELING AUTONOMOUS SYSTEM

Before framing Autonomous System For Personal Indoor Farming (ASFPIF), the Framework For Autonomy Levels For Unmanned Systems is reviewed in terms of the notions about its elements consisting the system.

2.2.1 What Is Autonomous System And Leveling: ALFUS

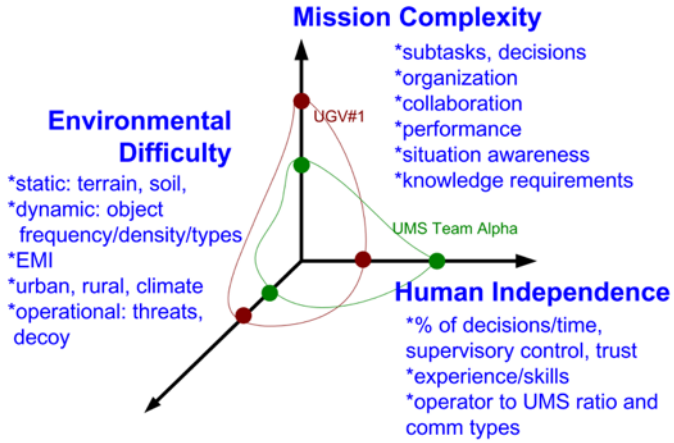

Figure 6. ALFUS detailed model

(hui-min huang, 2005)

The framework is built upon holistic viewpoint towards Unmanned system and it has a standard of leveling that is Autonomous Level For Unmanned System (ALFUS). According to the referred study, unmanned system (UMS) autonomy is related to the multiple technical areas. Among the related concepts, task complexity and adaptability to environment are the core of it. Also as the fundamentally UMS is for the collaboration with human users, the levels of involvement is the key to the degree of autonomy. ALFUS has three axis model with the main concepts such as; Mission Complexity, Environmental Difficulty, and Human Independence.

Figure 7. ALFUS Summary Model Overall Concept
(Hui-Min Huang, 2005)

In the three-axis model (Figure 6), the autonomy level is based on the complexity of the missions that a system can handle. The level of uneasiness of the environments and the missions are important for the overall ALFUS (Figure 7). In addition to the levels of operator interaction, or user interaction in design-wise term also varies along with the ALFUS that are required to perform the missions.

2.2.2 Farmers' Behavior – Farmers Adaptation Behavior Framework

To define necessary concept for ALFPIF, farmer behavior framework was reviewed. The 3 axis of ALFUS was about mission, environment and human thus the behavioral framework is critical to structure and arrange farming setting into unmanned system.

From the framework of Farmers Adaptation Behavior, there are 6 elements. Farmers Adaptation Behavior Concept Model has the elements such as; Awareness, Perception, Behavior, Media, Network and Intention. The perception means our sensory experience regarding surrounding world and also covers recognizing the environmental stimuli and reaction to these stimuli. (Abdolmotalleb Rezaei, 2017) In the context of PIF, the example can be like this: The basil is quite tall and the lighting might not have been enough all day long. It is processing the sensory data into meaningful information. The awareness refers to the concern or recognized issue for environmental problems. In other words, an aware person realizes dangers and difficulties and knows that he/she may be in trouble out of the consequences of the problem, so he/she is worried or conscious about it. When an environmental problem is realized, the awareness will improve and increase the understanding. For example, from the referred paper, a farmer is aware of water scarcity because it may affect productivity

(Sudarmadi et al., 2001). Also another example can be: The basil is too talk because of lack of lighting.

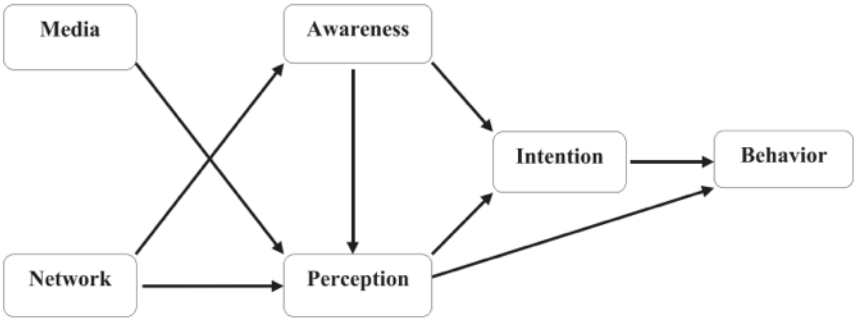

Figure 8. Theoretical Framework in a study about Farmers Adaptation Behavior (Abdolmotalleb Rezaei, 2017)

Definition on Theoretical Framework regarding Human Independence and Mission Complexity. According to the framework from a study regarding Farmers Adaptation Behavior in certain circumstances, behavior arousal framework is found to have steps from awareness, perception and behavior like a diagram below. This framework was mended for this research paper by separating the elements into side such as media, network and intention. By considering the autonomous system to be considered is single not treating it as a group of things, the elements put side are regarded to be expandable element from a basic system. That have low relevance with autonomy in personal indoor farming system.

Along with ALFUS the critical and relevant elements are awareness, perception and behavior to do mission under certain environment. Referring the farmer's adaptation elements, now the ALFPIF axis can be defined in detail like the following: Mission, Environment and Human Independence can be re-interpreted into the set of Awareness, Perception and Behavior. Definition on Theoretical Framework regarding Human Independence and Mission Complexity. According to the framework from a study regarding Farmers Adaptation Behavior in a certain circumstance, the behavior arousal framework is found to have steps from awareness, perception and behavior. It was partially derived from the referred frame work for this research paper by separating the elements into side such as media, network and intention. By considering the autonomous system is one single system not a group of things, the elements put side are regarded to be expandable elements from a basic system that have low relevance with autonomy in personal indoor farming system.

In conclusion, ALFPIF is defined like the figure below by distinguishing human independence of each stages by awareness, perception and action meant to be same with behavior from the reference.

Table 1. Defined Autonomous Level For Personal Indoor Farming

Stage	Example	Level 0	Level 1	Level 2	Level 3
Awareness	"Basil needs 1000ppm nutrient solution density.", "Too high solution density can cause roots' melting."				
Perception	"The density of solution in the pot is too high."				
Action	"Add more water in the pot."				
Dependency		Human		System	

2.3 EMOTIONAL BOND

2.3.1 Emotional Bonding With Personalized Products

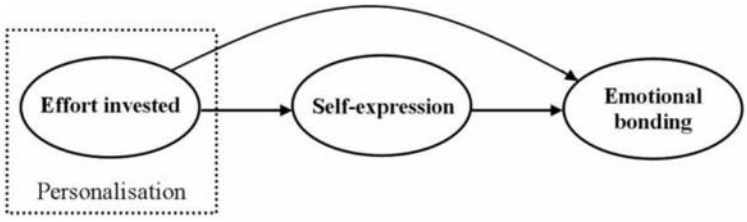

Figure 9. Conceptual Model Of Emotional Bonding With Personalized Products (Ruth Mugge, 2009)

Growing plant needs some efforts. Along with the context, the activity of farming inevitably needs efforts and it is reasonable estimation that emotional boding is formed based on this

backbone that is PIF is about caring the plants to eat and it is possible to make assumption that people become to form some emotional bonding on this activity or the subject plant itself by putting their effort on the process of caring.

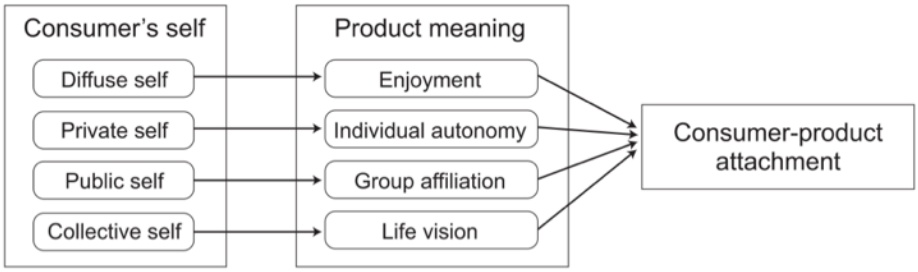

Figure 10. Proposed Conceptual Model Of Consumer-Product Attachment (Schifferstein, H. N. J., 2009)

To measure the emotional bond of users on the different levels of autonomy in personal indoor farming, the measurements devised by Schifferstein, H. N. J. in 2008 were revised. While the existing study focuses on the emotional bond towards the products with past experiences, the scenarios prepared in this research are all expected future experiences. It is also certain that the potential users would reflect their past memories and experiences but the past-arousing factors from the previous measures were excluded as much as possible, such as questions asking its quality of function or the tense of the sentence was changed into the future tense such as ‘were’ becoming ‘will be’.

As the scenarios are more future-heading based on expectation, the possible determinants of attachment from the same reference were also included into measurements. The possible determinants of attachment include questionnaires related to self-expression, memory-related, utility, life vision, enjoyment and market value.

Table 2. Questions For Measurement Revised From the Reference

EB Emotional Bonding		1	I would feel emotionally connected to this product.
		2	This product would mean a lot to me
		3	I would have no feelings for this product (-)
PD Potential Determinants	Memory Related	4	This product will remind me of persons who are important to me
	Self-Expression	5	This product would show who I am
		6	This product would stand for a particular way of life
	Utility	7	This product would make life easier for me
		8	This product would be very useful
	Life Vision	9	I believe this product would have a healing effect
	Enjoyment	10	It would be a pleasure to use this product
	Market Value	11	The product would be worth a lot of money
		12	This product would be very valuable

3. Methods

3.1 METHOD AND HYPOTHESIS FRAMEWORK OVERVIEW

To answer the research questions, one of the most critical issue was to set the unified set of autonomous system in different levels. Based on the definitions on the autonomous system of the four levels of personal indoor farming, the sets of scenarios were devised as the specimen to be tested by potential users in terms of emotional bonding.

3.2 SCENARIO GENERATION

Figure 11. Scenario Generation Workshop

To generate the sets of scenarios, a variety of creators were invited through 3 times of workshops. The different creators consist of experts in field of product design, UX design, service design, interaction design, Human-Computer Interaction and UI design. 10 out of 13 participants of workshop have +3 years of experiences in each field and they were regarded as the qualified experts for the generation workshop.

3.2.1 The Workshop Process

Figure 12. Workshop Session One About 7 Essence Of Personal Indoor Farming

The workshop process includes educational learning sessions related to main two concepts. One is Personal Indoor Farming and the other is autonomous system. After each lecture session, participants were given a group task to solve a problem aided with image cards such as posting photos on wall. By endowing group tasks, it was meant to build a common definition or understanding on each two concepts that is not much well-established concept in the academic terms or even in field that can this workshop can produce a kind of reference to be developed.

After two pair of sessions, finally participants are asked to do ideation on each autonomous level within limited time, which leads idea generated very quickly and being more focused. The time limit abided by 10 minutes strictly. A sample of sketches is in the Appendix.

3.2.2 Clustering The Scenarios

Table 3. Clustered Final Sets of Scenarios

	Autonomy Level				
Expandability		0	1	2	3
	Low	S#1	S#2	S#3	S#4
	High	S#5	S#6	S#7	S#8

In total 53 scenarios were collected through the workshops in every different tone of drawings. As a specimen, it was one critical issue to let the specimen have same tone of communication to avoid being biased thus all the scenarios were clustered in to groups and re-drawn by single tone of drawing by myself. In clustering, the groups were divided into 8 which is 4 autonomous levels from zero to 3 and 2 expandability tendency which is high and low. The expandability means whether the solution in the scenarios has expandability with the outer element of the system, such as expandability with surrounded appliances with IoT or existence and non-existence of mobile application.

Figure 13. Scenarios Sets

All the scenarios were produced into A4 sized cards with hardboards printed and also color-coded to avoid redundant measure (Appendix, Figure 13).

3.2.3 Scenario Validity

To make sure the validity of the scenarios as a specimen, 2 UX and service background designers reviewed all the scenarios and managed to have more detailed explanations in words.

3.3 RECRUITING

The recruiting was selectively executed with very tuned approach. More than couple of channels were utilized internal and external community where the research institute is located in. For the internal channel, the school SNS community was utilized mainly to recruit in-experienced group of people. To recruit people with the variety of lifestyle, I approached with very actively both in online and offline. Firstly, recruiting graphic posters were posted nearby community focusing on village areas and also people were recruited through some acquaintance. In online channel, by utilizing own brand Instagram, the card type of introductions was posted and it actually succeeded to gain some plant lover participants over distant area.

Figure 14. Recruiting Post On Instagram

In total, 46 participants answered for the prepared questionnaires and 45 sets of data were valid for the analysis. 22 of 45 valid participants' data were from the experienced group and rest of 23 participants was from the in-experienced group.

3.4 MEASURING EMOTIONAL BOND AND USER INFORMATION

3.4.1 Process

Offline participants were asked to make a visit at designated time. The total test time was within one hour. As all the questions are based on the 'What-if' situation to reflect themselves using the virtual product system, the information on what users are to do for doing personal indoor farming was provided in advance through 10-minute simple lecture. The information provided was the same one provided to the experts of the scenario generation workshop. After the simple lecture, participants had time to look all the scenario cards without questionnaires to check enough comprehension on the scenario sketch and the explanations. After card scanning session, participants were provided with randomized card one by one. Each survey for the scenarios were proceeded firstly putting the scenario number. The survey was provided through the own mobile devices of the participants by sharing google survey link.

To measure the emotional bond of users on the different levels of autonomy in personal indoor farming, the measurements devised by Schifferstein, H. N. J. in 2008 were revised. While the existing study focuses on the emotional bond towards the products with past experiences, the

scenarios prepared in this research are all expected future experiences. It is also certain that the potential users would reflect their past memories and experiences but the past-arousing factors from the previous measures were excluded as much as possible, such as questions asking its quality of function or the tense of the sentence was changed into the future tense such as 'were' becoming 'will be'.

As the scenarios are more future-heading based on expectation, the possible determinants of attachment from the same reference were also included into measurements. The possible determinants of attachment include questionnaires related to self-expression, memory-related, utility, life vision, enjoyment and market value.

Table 4. Questions Coded in Acronym and Translated in Korean

No	Translated		Original Questionnaire	Category	Acronym
Q1	이 시나리오의 제품을 사용하면 작물에 감정적으로 연결되는 기분일 것이다.	+	I would feel emotionally connected to this product.	Emotional Bonding	EB
Q2	이 시나리오의 제품은 나에게 의미가 클 것이다.	+	This product would mean a lot to me	Emotional Bonding	EB
Q3	이 시나리오의 제품은 나에게 중요한 사람들을 상기시켜 줄 것이다.	+	This product will remind me of persons who are important to me	Memory Related	MR
Q4	나는 이 시나리오의 제품에 대해 아무런 감정이 없을 것이다.	-	I would have no feelings for this product (-)	Emotional Bonding	EB
Q5	이 시나리오의 제품은 내가 누군지 보여줄 것이다.	+	This product would show who I am	Self-Expression	SE
Q6	이 시나리오의 제품은 특정한 삶의 방식을 대변한다.	+	This product would stand for a particular way of life	Self-Expression	SE
Q7	이 시나리오의 제품은 내 삶을 더 쉽게 만들것이다.	+	This product would make life easier for me	Utility	U
Q8	이 시나리오의 제품은 매우 유용할 것이다.	+	This product would be very useful	Utility	U
Q9	이 시나리오의 제품은 내가 힐링 되는 효과를 줄 것이다.	+	I believe this product would have a healing effect	Life Vision	LV
Q10	나는 이 시나리오의 제품을 즐거이 사용할 것이다.	+	It would be a pleasure to use this product	Enjoyment	E
Q11	이 시나리오의 제품은 비쌀 것이다.	+	The product would be worth a lot of money	Market Value	MV
Q12	이 시나리오의 제품은 매우 가치있을 것이다.	+	This product would be very valuable	Market Value	MV

The questions were all translated into Korean considering the majority of recruiting was executed within the range of Korean mostly in offline setting. In addition, setting the emotional bonding aside, additional question about the best and worst scenario was also included at the end of the survey to intuitively compare the preference of the solution by the participants.

3.4.3 Survey Part 2 - User Information

Along with the emotional bond, the potential users were also asked to answer for the questionnaires related to their Personal Indoor Farming experiences. As the participants are recruited in the separate two group distinguished by their experiences whether experience or in-experienced in personal farming, the questionnaire on the level of skill or knowledge on the personal farming was not asked specifically in the survey but interviewed in simple format to check the right or wrong of participant grouping. Participants answered on the willingness to do farming and the available time to personal indoor farming both in Liker scale. Other than

that, the basic questions about demographic information or lifestyle were given such as gender, birth year, nationality, vocation, housing style.

Table 5. Survey Questions About Basic User Information

P Personal Indoor Farming Related Information	Do you have willingness to farming in your space?
	How much time do you have viable for personal indoor farming?
G Generic Information *Not in Likert scale	Gender
	Birth Year
	Nationality
	Vocation/Job
	Housing Lifestyle
	Number of people living with

4. Result

4.1 EMOTIONAL BONDING ACCORDING TO SCENARIOS

The scores of three questions on emotional bonding from the 45 respondents were averaged per scenario (Figure X). S1 recorded the highest emotional bonding and S5 showed the second highest. The third highest emotional bonding was shown in S3 followed by S7. On the other hand, S4 showed the lowest emotional bonding and S8 showed almost the same low mean. The overall results indicate that two scenarios (S1 and S4) having zero autonomous level but different level in expandability belong to the highest emotional boding group. The second highest group (S3 and S7) is in autonomous level 2. The highest level of autonomy shows the least mean values in terms of emotional bonding.

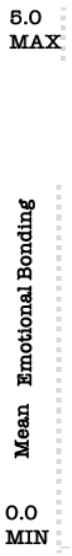

Figure 15. Mean distribution of PIF scenarios in terms of emotional bonding

4.2 EMOTIONAL BONDING DETERMINANTS AND SCENARIOS

The potential determinants for emotional bonding were also analyzed according to each scenario: *Memories, Self-Expression, Utility, Life Vision, Enjoyment* and *Market Value*. The following sub-sections show mean values of each scenario in terms of emotional bonding determinants (Figure 16).

For *memories*, the highest mean value on *memories* was shown in S1 and the second highest was in S5 while the lowest mean value was in S4. The overall mean values on *memories* showed a tendency of declining as the autonomous level gets higher.

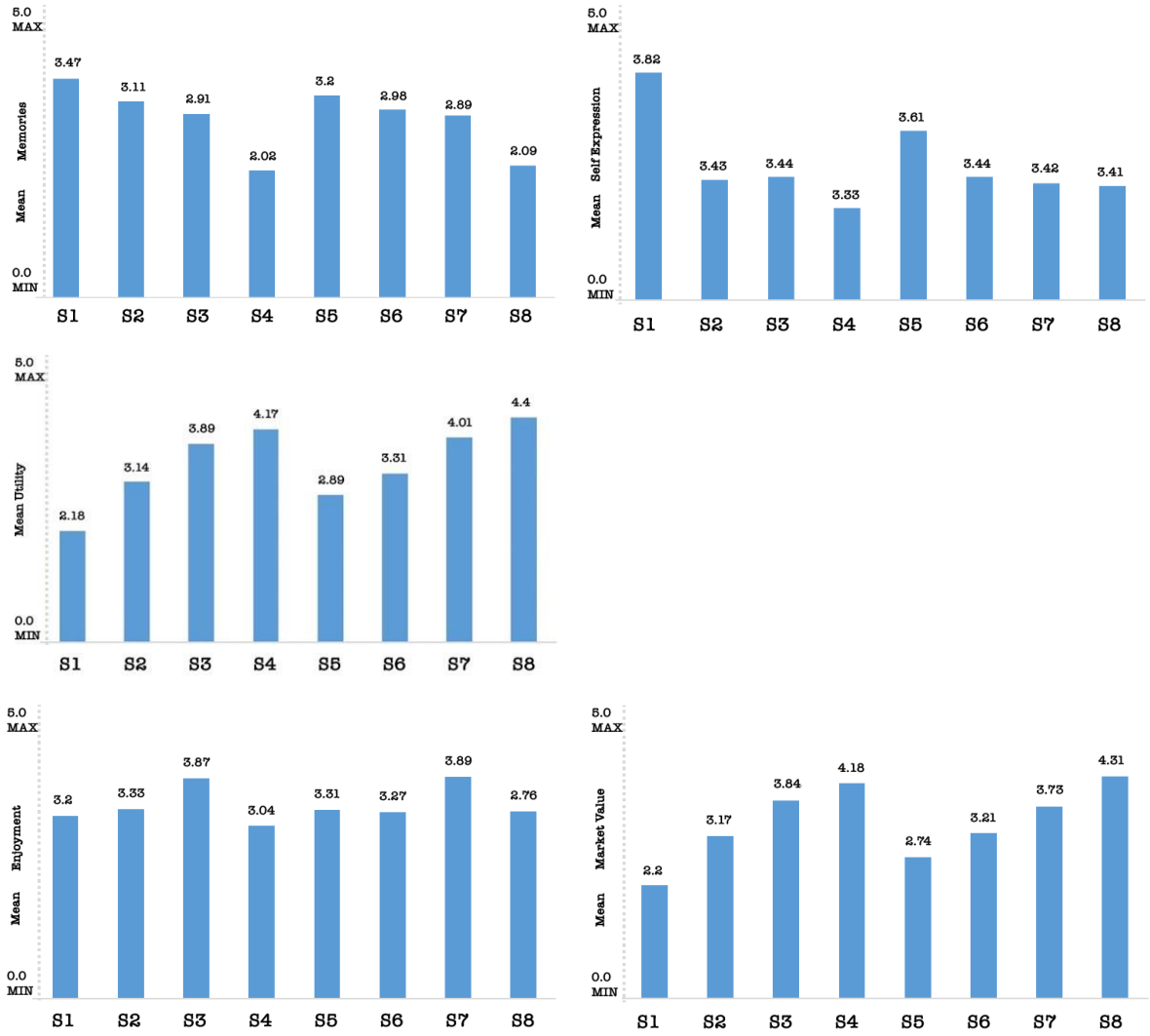

Figure 16. Mean distribution of determinants according to scenarios

Regarding *self-expression*, the highest mean value was shown in S1 and the second highest was in S5 while the lowest mean value was in S4. The second lowest one was in S8. The overall mean values of self-expression showed a tendency that the scenario with autonomous level zero gets highest while the scenarios at the other levels showed similar mean distribution.

The highest mean values on *utility* was observed in S8 and the second highest was in S4. However, the lowest mean was shown in S1 and the second lowest was in S5. The overall mean

values of *utility* showed a tendency of being proportional to the autonomous level. In other words, the value as *utility* gets higher as autonomous level goes up.

In *life vision*, both S1 and S3 were highest mean. The third highest was observed in S7 while the lowest mean value was in S4 and the second lowest was in S8. There is no particular pattern between the level of autonomy and *life vision*.

Regarding *enjoyment*, the highest mean was found in S7 and the second highest was from S3. The lowest mean was shown in S4 and the second lowest was in S1. The overall mean distribution of *enjoyment* showed a tendency that *enjoyment* goes up as the level of autonomy does so until level 2, but it decreases when it is in the highest level of autonomy. For *market value*, the highest mean value was shown in S8 and the second highest was in S4. On the other hand, the lowest mean value was observed in S1 and the second lowest was in S5. The overall mean values of market value showed a tendency of increasing as the autonomous level gets higher.

Throughout among determinants, there was not significant difference shown between low and high expandability. It means that expandability would not make any difference in emotional bonding.

4.3 DIFFERENCE IN EMOTIONAL BONDING BETWEEN INEXPERIENCED AND EXPERIENCED GROUPS

Figure 17 shows the mean difference between inexperienced and experienced groups. For the inexperienced, S1 has the highest mean value while S4 had the lowest mean value. However, there is little difference between low and high expandability. As the level of autonomy increases, the overall mean value of emotional bonding shows up and down pattern, which gets to the lowest mean at the highest autonomous level. For the experienced, the highest mean value was shown in S1 while the lowest mean value in S4. Like the inexperienced group, little difference was found between low and high expandability. The level of autonomy is inversely proportional to the mean value of emotional bonding. In order to identify the difference between inexperienced and experienced groups in emotional bonding, a Mann-Whitney U test was conducted (Table 6). The results indicate that there is not statistically significant difference between inexperienced and experienced group in emotional bonding of PIF.

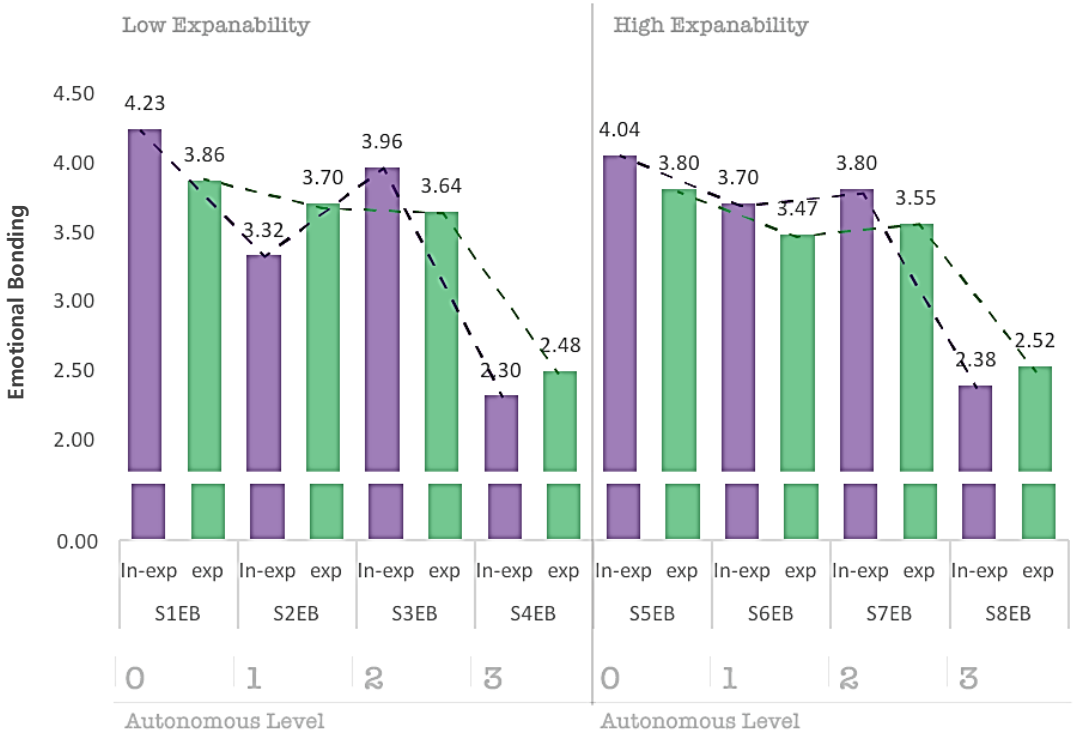

Figure 17. Comparison Of Emotional Bonding Between Inexp. And Exp. Groups

Table 6. Mann-Whitney U Analysis Under Grouping Variable of Experienced Group and In-Experienced Group

	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
S1	198.5	451.5	-1.252	**0.21**
S2	191.5	467.5	-1.421	**0.155**
S3	212	465	-0.941	**0.347**
S4	230	506	-0.527	**0.598**
S5	208	461	-1.035	**0.301**
S6	216	469	-0.852	**0.394**
S7	205.5	458.5	-1.09	**0.276**
S8	230.5	506.5	-0.517	**0.605**

a. Grouping Variable: Exp/In-Exp

4.4 MOST EMOTIONALLY BONDED SCENARIO AND CORRESPONDING DETERMINANTS BETWEEN TWO GROUPS

It turned out the most emotionally bonded scenario is S1 regardless of the level of experience. In order to identify the difference in determinants between inexperienced and experienced groups, the Mann-Whitney U test was used for S1 under the assumptions of the t-test are not met as each sample size for the group is under 30. (Exp. group has 22 and In-Exp. group has

23 respondents.) According to the Mann-Whitney U test, it shows that there is not statistically significant difference between Exp. group and In-Exp. group in terms of emotional bonding except *memories* (Z=-2.016, p=0.044). It implies that memories play more important role in experienced group than in-experienced group.

To figure out influential determinants for S1, Pearson correlation analysis was conducted (Table 7). Among the six determinants, *Enjoyment* and *Memorie*s show strong positive correlation with the mean value of S1. It implies *enjoyment* is the strongest influential determinants to emotional bonding, which is followed by *memories*.

Table 7. Pearson Correlation Among Variables (Total Respondents, N = 45)

		Emotional Bonding	Memories	Self Expression	Utility	Life Vision	Enjoyment	Market Value
Emotional Bonding	Pearson Correlation	1	**.482****	.345*	-.049	.390**	**.516****	.295*
	Sig. (2-tailed)		.001	.020	.747	.008	.000	.049
Memories	Pearson Correlation	.482**	1	.392**	-.265	.194	.200	.226
	Sig. (2-tailed)	.001		.008	.079	.201	.187	.135
Self Expression	Pearson Correlation	.345*	.392**	1	.041	.335*	.469**	.166
	Sig. (2-tailed)	.020	.008		.789	.025	.001	.276
Utility	Pearson Correlation	-.049	-.265	.041	1	.143	.258	.275
	Sig. (2-tailed)	.747	.079	.789		.350	.086	.068
Life Vision	Pearson Correlation	.390**	.194	.335*	.143	1	.675**	.551**
	Sig. (2-tailed)	.008	.201	.025	.350		.000	.000
Enjoyment	Pearson Correlation	.516**	.200	.469**	.258	.675**	1	.424**
	Sig. (2-tailed)	.000	.187	.001	.086	.000		.004
Market Value	Pearson Correlation	.295*	.226	.166	.275	.551**	.424**	1
	Sig. (2-tailed)	.049	.135	.276	.068	.000	.004	

****. Correlation is significant at the 0.01 level (2-tailed).**
***. Correlation is significant at the 0.05 level (2-tailed).**

Table 8. Pearson Correlation Among Variables (In-Experienced Group, N = 23)

		Emotional Bonding	Memories	Self Expression	Utility	Life Vision	Enjoyment	Market Value
Emotional Bonding	Pearson Correlation	1	.317	**.418***	.252	**.526****	**.582****	.408
	Sig. (2-tailed)		.140	.047	.246	.010	.004	.053
Memories	Pearson Correlation	.317	1	.412	-.097	.061	-.030	.067
	Sig. (2-tailed)	.140		.051	.659	.780	.891	.761
Self Expression	Pearson Correlation	.418*	.412	1	.244	.481*	.599**	.236
	Sig. (2-tailed)	.047	.051		.261	.020	.003	.278
Utility	Pearson Correlation	.252	-.097	.244	1	.366	.401	.346
	Sig. (2-tailed)	.246	.659	.261		.085	.058	.105
Life Vision	Pearson Correlation	.526**	.061	.481*	.366	1	.687**	.602**
	Sig. (2-tailed)	.010	.780	.020	.085		.000	.002
Enjoyment	Pearson Correlation	.582**	-.030	.599**	.401	.687**	1	.580**
	Sig. (2-tailed)	.004	.891	.003	.058	.000		.004
Market Value	Pearson Correlation	.408	.067	.236	.346	.602**	.580**	1
	Sig. (2-tailed)	.053	.761	.278	.105	.002	.004	

****. Correlation is significant at the 0.01 level (2-tailed).**
***. Correlation is significant at the 0.05 level (2-tailed).**

Table 9. Pearson Correlation Among Variables (Experienced Group, N = 22)

		Emotional Bonding	Memories	Self Expression	Utility	Life Vision	Enjoyment	Market Value
Emotional Bonding	Pearson Correlation	1	**.518***	.300	-.273	.285	**.480***	.142
	Sig. (2-tailed)		.014	.174	.218	.199	.024	.528
Memories	Pearson Correlation	.518*	1	.386	-.438*	.247	.370	.238
	Sig. (2-tailed)	.014		.076	.042	.268	.090	.287
Self Expression	Pearson Correlation	.300	.386	1	-.198	.175	.306	.060
	Sig. (2-tailed)	.174	.076		.376	.436	.166	.790
Utility	Pearson Correlation	-.273	-.438*	-.198	1	-.083	.094	.217
	Sig. (2-tailed)	.218	.042	.376		.715	.678	.332
Life Vision	Pearson Correlation	.285	.247	.175	-.083	1	.658**	.483*
	Sig. (2-tailed)	.199	.268	.436	.715		.001	.023
Enjoyment	Pearson Correlation	.480*	.370	.306	.094	.658**	1	.218
	Sig. (2-tailed)	.024	.090	.166	.678	.001		.331
Market Value	Pearson Correlation	.142	.238	.060	.217	.483*	.218	1
	Sig. (2-tailed)	.528	.287	.790	.332	.023	.331	

****. Correlation is significant at the 0.01 level (2-tailed).**
***. Correlation is significant at the 0.05 level (2-tailed).**

In order to find out the difference in determinants between inexperienced and experienced groups, Pearson correlation analysis was conducted. For the inexperienced group, *Enjoyment* showed the strongest correlation to *emotional bonding* of PIF (Table 8). This was followed by *Life Vison*. *Self-expression* also has strong correlation to the emotional bonding. For experience group, *Enjoyment* showed strong correlation to the emotional bonding of PIF like the case of the inexperienced group but *Memories* showed the strongest correlation to the emotional bonding, which is different from the result for the inexperienced.

4.5 PREFERENCE BETWEEN SCENARIOS

Apart from emotional bonding, favorite scenario and non-preferred scenario were measured among scenarios. According to the result, S7 was chosen as most preferred scenario while most non-preferred scenario was S4 (Figure 18). The result indicates that the respondents prefer a PIF with autonomous level 2 but high expandability. On the other hand, the respondents perceived a PIF with highest level of autonomy but low expandability as most non-preferred scenario. Interestingly, S1 was ranked as the second non-preferred scenario, which evoked the strongest emotional bonding in the previous section. It might imply that the preference of PIF is not necessarily based on emotional bonding.

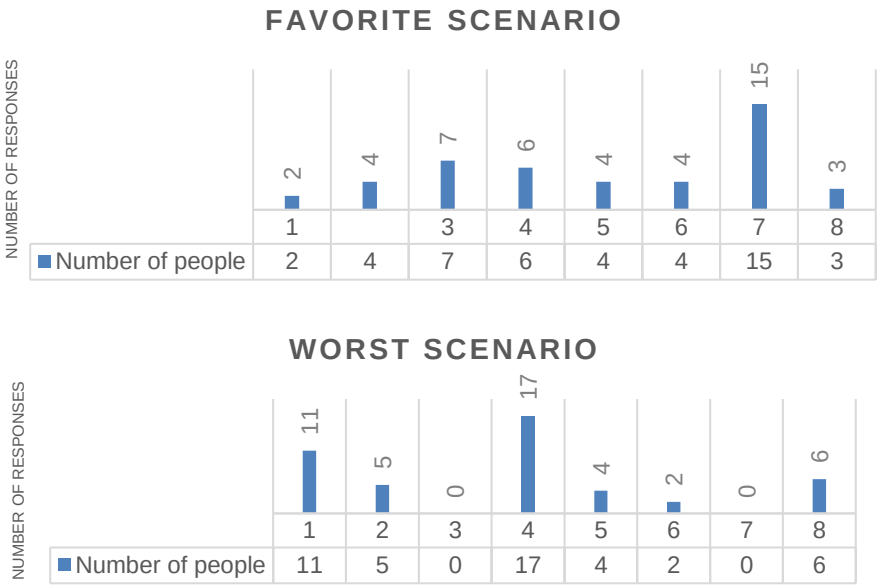

Figure 18. Preferred scenario and non-preferred scenario

5. Discussion

5.1 THE TENDENCY ON EMOTIONAL BONDING AND PREFERENCES

S1 showed the highest mean in emotional bonding. But it was also found as the second non-preferred scenario that the respondents are not willing to use. Based on the after-survey interview, it is assumable that the amount of emotional bonding required for S1 might be too burden to the potential users considering the autonomous system endowing too much human independence for the mission. One of the participants, who had chosen S1 as the most non-preferred, answered that he was afraid of killing the plants because of lack of his time resource and skills. Also, another participant said that she wanted to pay attention just when she affords time for caring the plants. This may imply that the relationship between emotional bonding and the overall preference by potential users is not in a simple linear proportional relation but it is assumed to have a certain level of autonomy that can keep both emotional bonding and the overall preference. For instance, that is like S7 with the autonomous level 2 that showed the second highest emotional bonding.

It was the initiator of this project that emotional bonding on sustaining their PIF had been often mentioned in a preliminary study. According to the result of emotional bonding and overall preference, the most non-preferred scenario (S4) has the lowest mean in emotional bonding.

Ironically, this scenario is very similar to one of the cases in South Korea which is used to be an issue-raising product advertised with a famous actress model but not found to have steady users yet according to preliminary interview. (Figure 19)

Figure 19. Commercial Scene of The South Korean Product Case (S4)

5.2 PRIOR EXPERIENCE IN EMOTIONAL BONDING

According to the result, there was any difference found between inexperienced and experienced group in terms of emotional bonding and autonomous level. On the other hand, there was a difference in the potential determinants influencing emotional bonding. *Enjoyment* was a significant determinant that influences emotional bonding in both groups. However, the determinant shows a stronger correlation with emotional bonding for the inexperienced group than the experienced group. For the inexperienced group, *self-expression* and *life vision* were also significantly related to emotional bonding of PIF. For the experienced group, *memories* showed a strongest correlation with emotional bonding of PIF. Based on it, it is assumable that experience in PIF may change the determinants influencing emotional bonding with PIF. It seems PIF would be something to show their identity for the inexperienced people while it would be something to associate the *memories* for the experienced people.

5.3 DETERMINANTS AND STRATEGIC IMPLICATIONS

Some particular tendencies were shown through the analysis of emotional bonding and the potential determinants. First, there were some determinants showing a linear relationship over the level of autonomy (Figure 20). For *market value* and *utility*, as the higher autonomous level is, it is more likely that emotional bonding increases. For *memories*, as the level of autonomy increases, emotional bonding becomes weaker generally.

A possible implication is that the more autonomous the PIF system is, people feel as if it had more *market value* that is often expressed as expensive, more value in *utility*, but less *memories* engaged. These insights can be reflected into product specifications. For example, A PIF product with the highest autonomous level may be more suitable for the utilitarian users who want to grow and harvest vegetables in a secure way. In this case, the product can have a bigger size like refrigerator and the economic value should be guaranteed in a way to provide more economical benefits than buying organic vegetables at the grocery stores. If it is the case, the PIF product could be positioned as essential home appliances such as refrigerators, dish washers or laundry machine to help home chores.

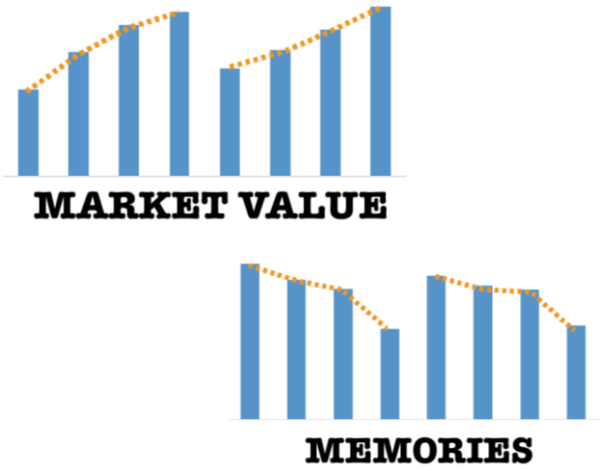

Figure 20. The Linear Patterns of Determinants *Memories, Utility* and *Market Value*

Second, life vision and emotional bonding shows a two-peak form that has two dominant values at the autonomous level of zero and 2 over others. Also it has the lowest value in the highest autonomous level. It implies that the healing effect could be generally maximized when autonomous functions are hardly provided in PIF products. In case of S3, probably a certain level of autonomy while keeping the healing effect would be necessary for those who experience the lack of time and effort for PIF.

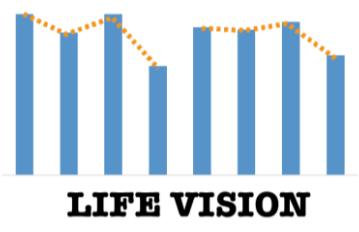

Figure 21 The Pattern of The Determinant *Life Vision*

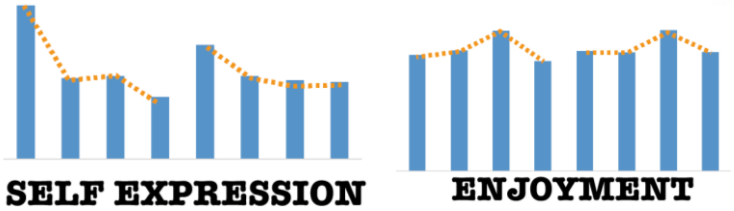

Figure 22. The Pattern of The Determinants *Self Expression* and *Enjoyment*

Third, *Enjoyment* and *Self-expression* show a single-peak form that has one dominant value over all the scenarios. In *Enjoyment*, the autonomous level 2 shows highest mean, while in self-expression, the autonomous level zero shows the highest mean. It implies that the autonomous level two is expected to provide the most enjoyment than other scenarios. It seems that expressing users with PIF would not play a role as the level of autonomy increases. A PIF product with autonomous level zero is expected to have more chance of self-expression to the potential users. Considering the pattern of Enjoyment, gamification is one of the way for the users to build more emotional bonding. For instance, it is possible to develop a kit based on the quests that users can feel achievement through games format of guidebook. On the other hand, the autonomous level zero with more self-expression element is another way to build more emotional bonding. Based on the product communication with the user, diary and SNS function could be more emphasized through accessorizing sub-products such as diary like moleskin or SNS like Instagram app.

5.4 DESIGN IMPLICATIONS

Overall, the study revealed the emotional bonding varies according to the level of system autonomy of personal indoor farming. And the 6 determinants of emotional boding can be regarded as the elements in design specifications and marketing mix that the practitioners could consider in the process of product development and marketing process. The highest autonomous level scenarios showed the lowest emotional bonding. Interestingly, they were solutions to automate every stages of PIF for the highest users' convenience. From a utilitarian perspective, it is always right to have convenient and efficient solutions. On the other hand, the study indicates that for the long-term and sustainable product usage, the autonomous level could matter in terms of emotional bonding of PIF. Based on the findings from the study, several design implications can be developed. First, the autonomous level zero with more

enjoyment and life vision is a good mix to build more emotional bonding especially for the inexperienced. group. The autonomous level two with more memories and enjoyment is a possible mix possible especially for the experienced group. On deciding and developing a real product, more detailed approach is necessary based on these mix concepts.

5.5 LIMITATIONS AND FURTHER STUDY

While the current study suggests potential design implications on PIF in terms of autonomous level, it requires to develop further details of product and interaction through the practical process. As PIF products needs sustainable supply on the supplementary products during usage such as seed, seedling, nutrients and etc., the service or market channel driven perspective would be another essence to be considered.

Recruiting in two groups, the experienced group was the people who have achieved all the 7 essence of the PIF while the inexperienced was regarded as people who have not fully achieved all the 7 essence before. Within the inexperienced group, the level of experience also varied. In other words, all the inexperienced group have not experienced any activities of PIF at all. Some of them have partially experienced growing plants at home. This might influence the result that there is no difference in emotional bonding between two groups. Therefore, a further study needs to take this into consideration.

One of the main part of this project is that all the measurement is based on the scenarios. The participants are all required to think of ‘What-if’ based on the provided drawing and explanation cards. To measure emotional bonding on the experience in the product, it would be necessary in the further study to measure along with the usage of the products over certain time.

6. CONCLUSION

While many of PIF products are coming out in the world, it was a barren area on the study in terms of user experience about personal indoor farming. Tech-driven approaches over world network is also important like that of study in MIT OpenAg, but it is a critical element for providing the innovative solutions for the general users. This research is a result of struggling to approach personal indoor farming in terms of autonomous system. As there is no framework for PIF yet, the framework called ALFPIF (Autonomous Level For Personal Indoor Farming) was devised based upon the previous works about unmanned system, farmers behavior theory and autonomous system in industrial agriculture. It is expected that the framework devised

from this research can be further developed and utilized through relative studies and even to the practitioners who plan to develop PIF solutions based on autonomous system. In the study, it was also found out why people put emotional bonding on PIF. This categorization can be a segmentation cue in marketing or design in terms of target user group. In addition, leveling emotional bonding on the PIF experience would be critical to sustain people's purchase and usage of PIF.

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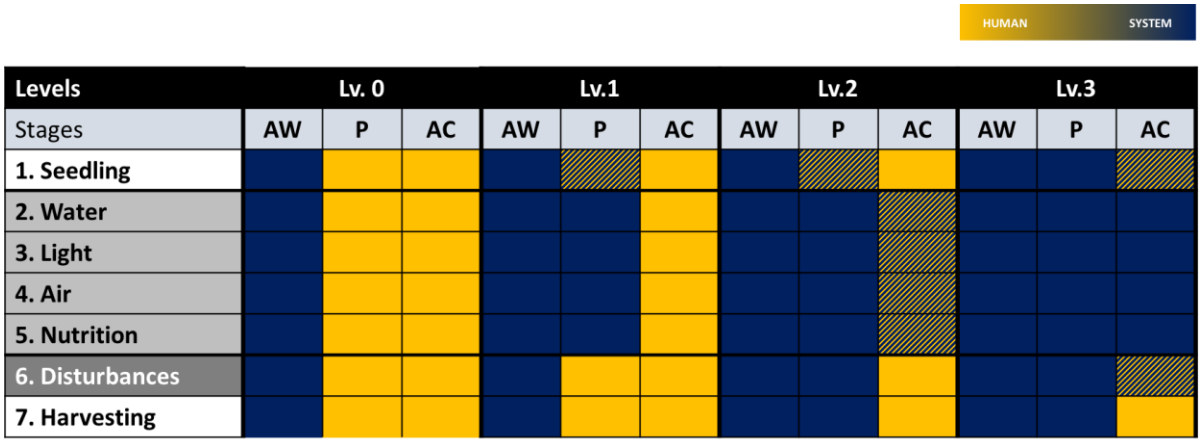
Appendix 1 - Data logging from 16 PIF Products In the Market, 2018

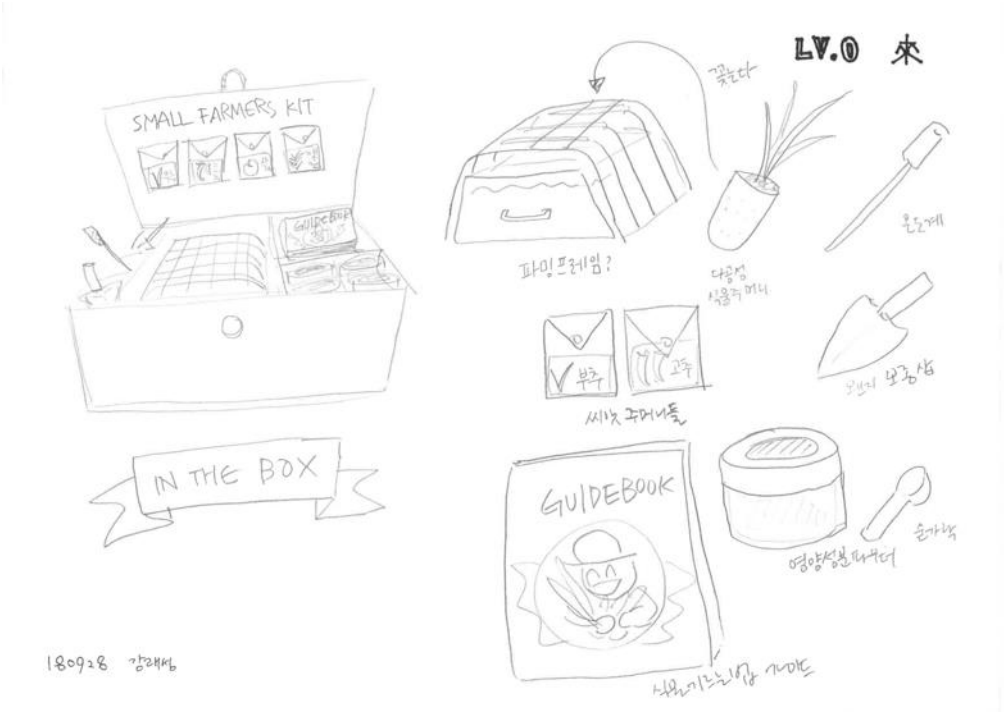
No.	PRODUCTS	Installation	Lighting	Implanting	Growing System	Medium	Nutrient Solution	Powered
1	InFarm Microgarden Kit (Germany)	Table-top	none	Seed	Simple watering	Gel-based	none	none
2	Sprouts IO (USA)	Table-top	Yes	Capsule	Hydroponics	Artificial Soil	none	Yes
3	IKEA Indoor Farming Kit	Table-top, On-the-floor	Yes	Seed	Hydroponics	Soil	Yes	Yes
4	Wells Farm (South Korea)	Table-top	Yes	Seedling	Hydroponics	Artificial Soil	Yes	Yes
5	Herbert (Gemany)	Wall-mounted	Yes	Seed	Hydroponics	Artificial Soil	Yes	Yes
6	Planty Square (South Korea)	Table-top	none	Capsule	Hydroponics	Artificial Soil	none	none
7	Grass lamp – For Wheatgrass	Table-top	Yes	Seed	Simple watering	water-only	none	Yes
8	Nutri Tower(France)	On-the-floor	Yes	Seedling	Hydroponics	Soil	Yes	Yes
9	Green Farm Series (Japan)	Table-top, On-the-floor	Yes	Seed	Hydroponics	Artificial Soil	Yes	Yes
10	Supura Garden (Finland)	On-the-floor	none	Seedling	Hydroponics	Soil	Yes	Yes
11	Grove Lab (USA)	On-the-floor	Yes	Seedling	Aquaponics	Artificial Soil	none	Yes
12	Grow Chef	Table-top	Leveling	Capsule	Hydroponics	Artificial Soil	none	Yes
13	Calla(France)	Table-top	Yes	Seedling	Simple watering	Soil	none	Yes
14	Akarina01(Japan)	Table-top	Leveling	Seed	Hydroponics	Artificial Soil	Yes	Yes
15	Plantui (Finalnd)	Table-top	Leveling	Capsule	Hydroponics	Artificial Soil	Yes	Yes
16	Click & Grow (UK)	Table-top	Yes	Capsule	Hydroponics	Artificial Soil	none	Yes

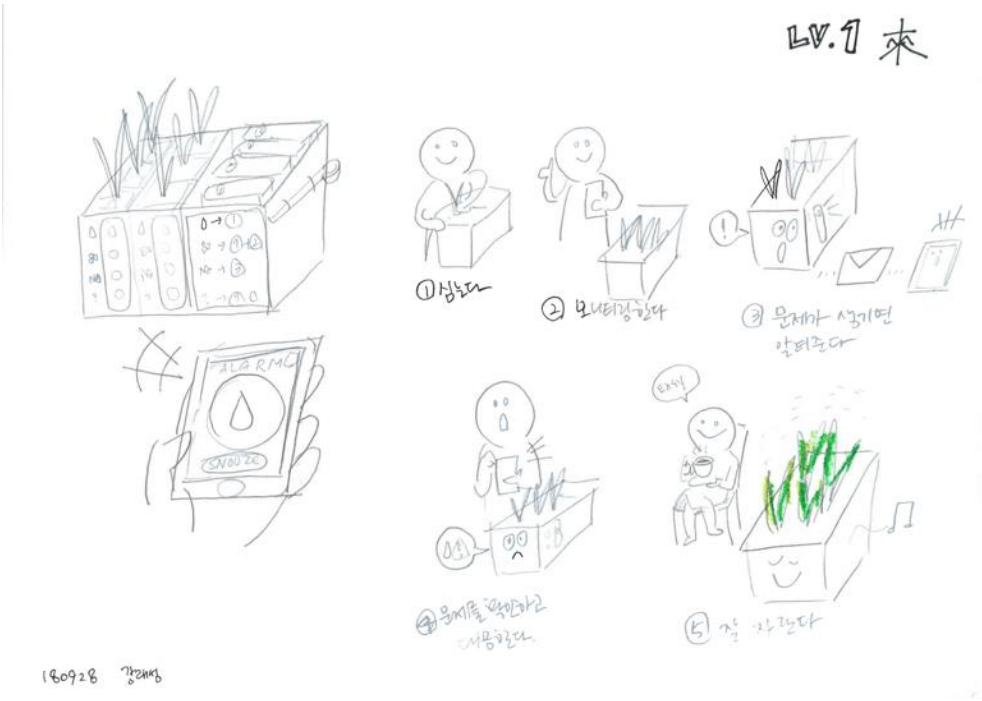
Appendix 2 – ALFPIF definition for each stage of farming stages (AW; Awareness, P; Perception, AC; Action)



S#	Info1	Info2	Main Product Type	Components	Type of Seedlign and watering	Nutrient and lighting	Sensors
1	**Manual Book**	Checklist	**Main Product**	Port and Bed	Seed	Nutrient Powder	
2	**Manual Book**	Checklist	**Main Product** + Sensor Data Visualization	Port, Bed and Seed	Water Gaze Signifier	LED Lighting Timer	Temperature Degree TDS Degree
3	**Manual Book**	On-product Display	**Main Product** + Instruction Visualization	Port, Bed, Seed and Nutrient	Water Tank Top	Light Saturation in Face Icon	Temperature In Color
4	**Manual Book + App** Augmented Services	Delivery	**CLOSED TYPE Main Product**	Port, Bed, Seed and Nutrient	Built-in irrigation	Lighting Automated	Temperature Automated
5	**Manual App**	App Diary	**Main Product**	Port and Bed	Seed	Nutrient Powder	
6	**Manual App**	Data shown through App	**Main Product** + Sensor Data Visualization	Port, Bed and Seed	Water Gaze Signifier	LED Lighting Timer	Temperature Degree TDS Degree
7	**Manual App**	Push Alarm	**Main Product** + Instruction Visualization	Port, Bed, Seed and Nutrient	Water Tank Top	Light Saturation in Face Icon	Temperature In Color
8	**Mobile App** Augmented Services	Delivery, Recommend Push	**OPEN TYPE Main Product** + IoT hub based	Port, Bed, Seed and Nutrient	Built-in irrigation	Home hub lighting control	Home hub temperature control

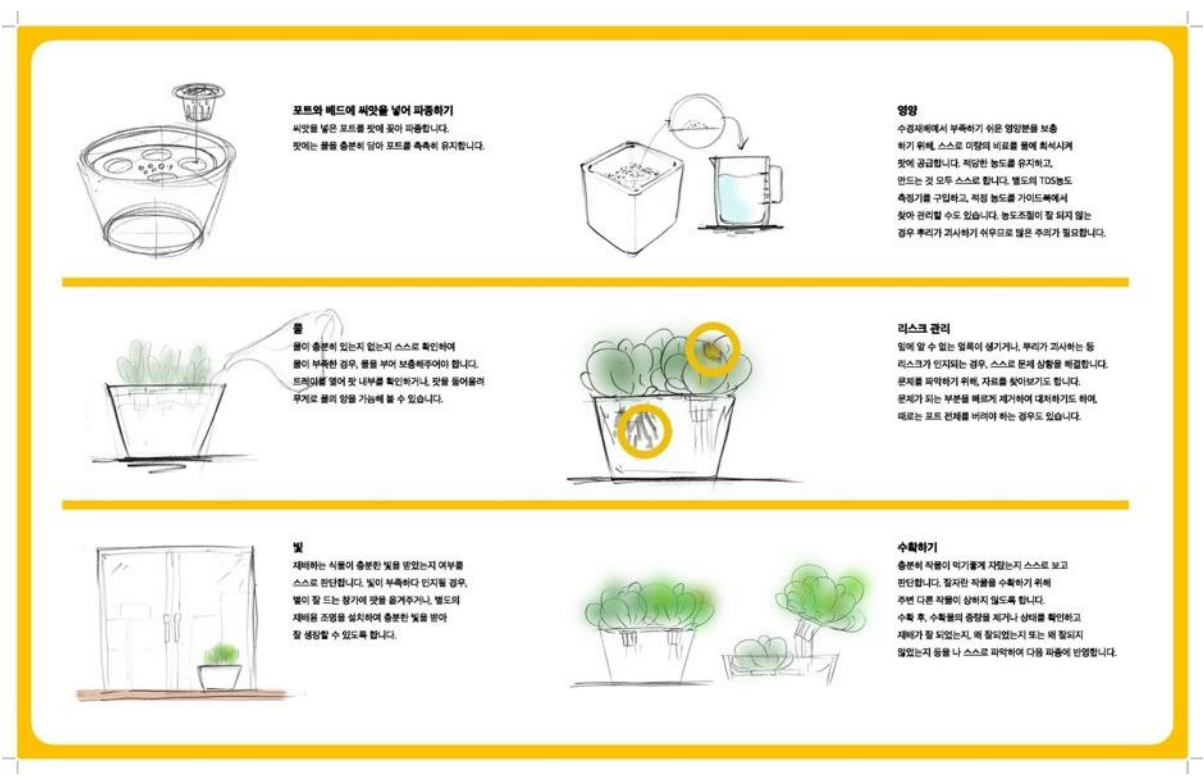
Appendix 4 - Idea generation workshop sketch example





APPENDIX B Workshop Materials (PIF Cards, Autonomy Leveling Session)

1



2

“ 제품이 식물에 물과 빛을 공급하고 제품에서 식물 재배 환경에 대한 정보를 보여줍니다. ”

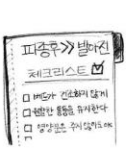
재공된 가이드 북과, 재료를 가지고 충분히 재배를 이해한 뒤에 스스로 식물 재배를 합니다.
부족한 배경지식은 스스로 책이나, 인터넷, 지인 등을 충분히 활용하여 습득합니다.
식물을 키우는 환경에 대해 스스로 인지하고 필요한 부분을 채우기 위해 대처합니다.
식물의 상태를 스스로 인지하고, 물-빛-영양 등에 대해 스스로 대처합니다.
식물의 생육 환경에 대한 빛, 물, 온도 등의 정보는 제품 내에서 정량적으로 보여줍니다.
제품에서 제공하는 정량적인 데이터를 보고, 스스로 판단하여 식물에게 물, 빛, 영양 공급을 합니다.

제품 구성

생육에 필요한 빛 on/off기능이 있고, 환경 데이터를 보여주는 제품 본체
수경재배 팟
씨앗이 들어있는 카트리지 - 영양분 미포함
재배 가이드 북
액상 비료

식물별 키우기 가이드 북
식물별로 키우기 가이드 북이 제공되어
씨앗 심기부터, 수확에 이르기까지 필요한
모든 정보가 담겨있습니다.

또한 일지 형식의 기록지가 첨부되어,
스스로 재배 상황을 기록할 수 있습니다.

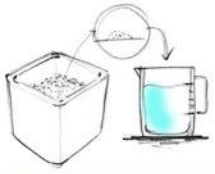


생장 단계별 체크리스트
생장 단계별로 주의해야할 사항을
체크리스트로 만들어 제공합니다.
가이드 북 내에 포함되어 있으며
각 체크리스트는 절취선을 이용해
떼어내어 간편히 이용할 수 있습니다.

파종 방식
씨앗이 들어있는 인공 토양이 카트리지 형태로
포장되어, 원하는 작물별로 구입하여 제품에
꽂아 사용할 수 있습니다. 영양분은 포함되어 있지
않아, 별도로 영양분을 주어야 합니다.

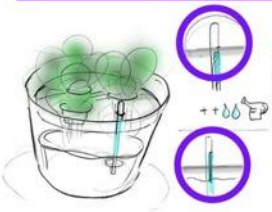
포트를 개봉하여 꽂아 파종하기
원하는 씨앗이 들어있는 포트를 개봉하여
팟에 꽂아 파종합니다.
팟에는 물을 충분히 담아 포트를 촉촉히 유지합니다.

빛
재배하는 식물이 충분한 빛을 받았는지 여부를
제품 상단 패널에 있는 디스플레이를 통해 알 수 있습니다.
노란 동그라미는 빛을 쬔 시간, 보라색은 쬐지 않은 시간을
뜻하며, 하루 최소 8시간의 암전시간을 지키도록,
사용자 스스로 제품 본체의 on/off버튼을 이용하여
조절할 수 있습니다.



영양
수경재배에서 부족하기 쉬운 영양분을 보충
하기 위해, 스스로 미량의 비료를 물에 희석시켜
팟에 공급합니다. 적당한 농도를 유지하고,
만드는 것 모두 스스로 합니다. 별도의 TDS농도
측정기를 구입하고, 적정 농도를 가이드북에서
찾아 관리할 수도 있습니다. 농도조절이 잘 되지 않는
경우 뿌리가 괴사하기 쉬우므로 많은 주의가 필요합니다.

리스크 관리
잎에 알 수 없는 얼룩이 생기거나, 뿌리가 괴사하는 등
리스크가 인지되는 경우, 스스로 문제 상황을 해결합니다.
문제를 파악하기 위해, 자료를 찾아보기도 합니다.
문제가 되는 부분을 빠르게 제거하여 대처하기도 하며,
때로는 포트 전체를 버려야 하는 경우도 있습니다.



물
물이 충분히 있는지 없는지 스스로 확인하여
물이 부족한 경우, 물을 부어 보충해주어야 합니다.
트레이에 꽂혀있는 케이지 바를 통해, 물이 얼마나
남아있는지, 트레이를 개봉하지 않고 알 수 있습니다.

수확하기
충분히 작물이 먹기좋게 자랐는지 스스로 보고
판단합니다. 칠지란 작물을 수확하기 위해
주변 다른 작물이 상하지 않도록 합니다.
수확 후, 수확물의 증량을 제거나 상태를 확인하고
재배가 잘 되었는지, 왜 잘되었는지 또는 왜 잘되지
않았는지 등을 나 스스로 파악하여
다음 파종에 반영합니다.

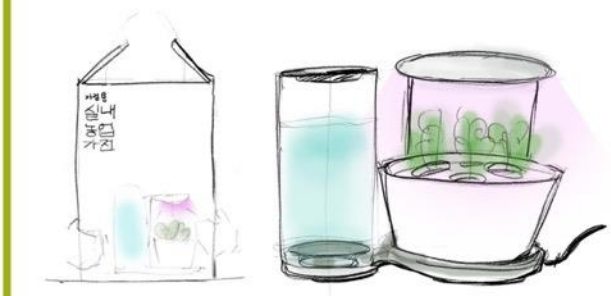
3

“ 제품에서 식물에게 필요한 조건에 따라 사용자가 해야할 일을 알려줍니다.”

제품이 식물의 상태에 대한 판단을 해줍니다. 제품 본체 상단에서, 사용자에게 [빛이 충분하여 좋아요] 또는 [물이 부족하니 보충해주세요] 등의 구체적인 행동을 요구합니다. 영양분이 들어있는 포트를 구입하여, 포장을 뜯고 제품에 꽂아 재배합니다. 별도의 물탱크가 있어, 물탱크의 물이 소진되기 전까지는 물을 따로 줄 필요가 없습니다.

제품 구성

생육에 필요한 LED 기능
물 공급을 위한 물탱
환경 데이터와 함께 해야할일을 보여주는 디스플레이
수경재배 팟
씨앗이 들어있는 카트리지 - 영양분 포함
재배 가이드 북



식물별 키우기 가이드 북

식물별로 키우기 가이드 북이 제공되어
씨앗 심기부터, 수확에 이르기까지 필요한
모든 정보가 담겨있습니다.

또한 일지 형식의 기록지가 첨부되어,
스스로 재배 상황을 기록할 수 있습니다.

식물의 상태와 해야할 일을 보여주는 디스플레이

제품 본체 상단의 디스플레이를 통해
식물이 있는 환경에 대한 정량적 정보와
사용자가 식물을 위해 해야할 일을
보여줍니다. 사용자는 언제 물을 줘야하는지,
빛을 줘야하는지 제품을 통해 알게 됩니다.

파종 방식

씨앗이 들어있는 인공 토양이 카트리지 형태로
포장되어, 원하는 작물별로 구입하여 제품에
꽂아 사용할 수 있습니다. 영양분 또한 포함되어 있어
별도의 영양분 투여가 필요하지 않습니다.

식물의 상태와 해야할 일을 보여주는 디스플레이

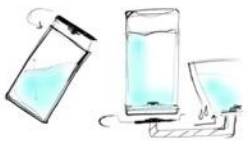
제품 본체 상단의 디스플레이를 통해
식물이 있는 환경에 대한 정량적 정보와
사용자가 식물을 위해 해야할 일을
보여줍니다. 사용자는 언제 물을 줘야하는지,
빛을 줘야하는지 제품을 통해 알게 됩니다.

디스플레이 데이터 예시:

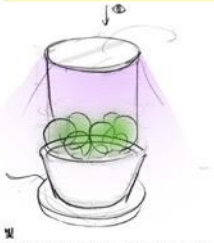
온도:
18도 - 27도 - 좋아요
10도 이하 - 추워요. 온도를 높여주세요

영양

수경재배에서 부족하기 쉬운 영양분을 보충
하기 위해, 포트에서 시간에 따라 적당한 양의
영양분이 용해되도록 설계되어
별도의 영양을 희석시켜주지 않아도 됩니다.



물을 공급하기 위해서는 별도의 물탱크에 물을 담아두면, 제품이
자체적으로 물을 공급합니다. 물탱크의 물을 모두 소진하였을시,
상단 디스플레이를 통해 [물이 부족해요! 물탱크의 물을 채워주
세요] 라는 직접적인 행동을 요구하는 메시지가 나옵니다.



빛

제품에서 빛은 기본적으로 8시간 암전, 16시간 빛 공급의
패턴으로 조절이 됩니다. 계절이나 여타 환경 변화로 인해
빛 공급이 초과하거나 부족한 경우, 디스플레이를 통해
[빛을 너무 많이 쬐어 휴식이 필요합니다. 불을 꺼주세요]등의
직접적 지시를 담은 메시지가 나옵니다. 메시지에
따라 행동하기만 하면, 빛조절을 해낼 수 있습니다.

리스크 관리

잎에 알 수 없는 얼룩이 생기거나, 뿌리가 괴사하는 등
리스크가 인지되는 경우, 제품이 문제를 인지하여, 경고등을
보여줍니다. 경고등이 들어온 경우, 뿌리를 확인하여 곰팡이나
괴사된 뿌리가 있을 경우, 직접 제거하도록 합니다.

수확하기

충분히 작물이 먹기좋게 자랐는지 제품이 무게를 감지하여
수확알림을 줍니다. 잘자란 작물을 수확하기 위해
주변 다른 작물이 상하지 않도록 합니다.
수확 후, 수확물의 중량을 재거나 상태를 확인하고
재배가 잘 되었는지, 왜 잘되었는지 또는 왜 잘되지
않았는지 등이 제품을 통해 파악되고 나 스스로
다음 파종에 반영합니다.

4

“스스로 완전히 작동하는 작은 온실입니니다. 빌트인으로 설치되고, 문제 상황을 해결하기 위해 설치기사가 방문하기도 합니다..”

제품을 구입하면 설치기사가 집에 방문하여, 수도와 제품을 연결하고 제품은 자체적으로 물을 공급, 오수를 제거 그리고 빛, 온도 또한 모두 자체적으로 조절하게 됩니다. 식물이 갇힌 환경을 조성하여, 모든 조건들이 100% 인공지능으로 조절되며, 사용자가 해야할 일은 어떤 작물을 심을지, 추가 결제에 대해 승인할지 등을 결정하는 것들입니다.

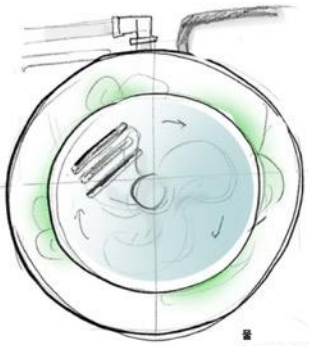
제품 구성
- 빌트인 제품
- 매 시즌 포트 배달 받기
- 나의 농장 리포트

나의 농장 시즌별 리포트

포트를 소진하고 새로운 포트를 받을 때 마다,
작물 재배 환경 데이터 추이, 가장 잘자란 작물,
새로운 작물에 대한 정보 등, 구독지 형태의
리포트가 전달됩니다.

파종 방식

새로운 작물 포트는, 전화 또는 어플을 통해
추천안 에서 골라 배달받을 수 있습니다.
또는 방문 기사를 통해, 다음 작물을 고를 수 있습니다.



물

개수대와 연결되어 설치된 제품에 자동으로
맑은 물이 공급되고, 오수 또한 자동으로 배출되어
깨끗한 물이 유지 됩니다.

환기와 온도

내장 발열체와, 팬으로 환기와 온도를 자율적으로
조절합니다.

빛

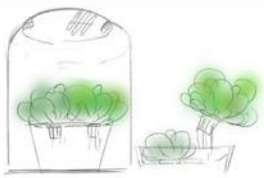
제품내 빛 센서가 자동으로 하루 내 광량 총족
여부를 확인하고, 하루 목표 광량을 충족시키기 위해
LED 등 시스템이 자율적으로 조절합니다. 작물에 맞게
설정된 Climate Recipe를 통해 알아서 조절되어, 사용자
는 따로 신경쓰지 않아도 됩니다.

영양

수경재배에서 부족하기 쉬운 영양분을 보충
하기 위해, 포트에서 시간에 따라 적당한 양의
영양분이 용해되도록 설계되어
별도의 영양을 첨석시켜주지 않아도 됩니다.

리스크 관리

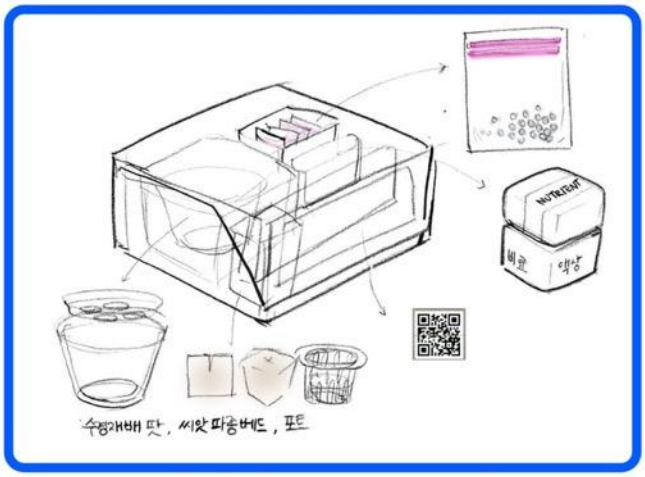
딤에 알 수 없는 얼룩이 생기거나, 뿌리가 과사하는 등
리스크가 인지되는 경우, 제품이 어플리케이션을 통해
기사의 방문을 승인하도록 사용자에게 요청합니다.
승인시, 기사가 방문하여 문제 사항을 해결합니다.



수확하기

충분히 수확할만큼 자란 식물은, 자동으로 포트에서 올라와
사용자가 먹을 수 있도록 보관됩니다. 보관된 포트의
작물을 제거하면, 새로운 작물을 심도록 유도하는 전화
또는 어플리케이션의 푸시알림을 받게 됩니다.

5



"키우는 방법을 알려주고, 필요한 기본 재료를 제공합니다."

제공된 가이드 어플리케이션과, 재료를 가지고 충분히 재배를 이해한 뒤에 스스로 식물 재배를 합니다.
부족한 배경지식은 스스로 책이나, 인터넷, 지인 등을 충분히 활용하여 습득합니다.
식물을 키우는 환경에 대해 스스로 인지하고 필요한 부분을 채우기 위해 대처합니다.
식물의 상태를 스스로 인지하고, 물-빛-영양 등에 대해 스스로 대처합니다.

제품 구성
- 수경재배 땃
- 씨앗 파종 베드와 포트
- 종류별 씨앗
- 재배 가이드어플 큐알 코드
- 액상 비료

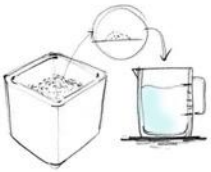
식물별 키우기 가이드 북
식물별로 키우기 가이드 큐알코드가 제공되어
씨앗 심기부터, 수확에 이르기까지 필요한
모든 정보가 담겨있습니다.

생장 단계별 체크리스트
생장 단계별로 주의해야할 사항을
체크리스트로 만들어 제공합니다.
가이드 북 내에 포함되어 있으며
각 체크리스트는 어플리케이션으로
간단히 확인 가능합니다.

또한 나의 재배 상황을 기록할 수 있습니다.

파종 방식
파종을 위해 파종 베드, 포트, 씨앗이 모두 따로
제공됩니다. 필요에 따라 베드와 포트에 씨앗을
넣어 사용합니다. 포트에는 영양분은 포함되어
있지 않아, 별도로 비료를 투입해주어야 합니다.

포트와 베드에 씨앗을 넣어 파종하기
씨앗을 넣은 포트를 땃에 꽂아 파종합니다.
땃에는 물을 충분히 담아 포트를 촉촉히 유지합니다.



영양
수경재배에서 부족하기 쉬운 영양분을 보충
하기 위해, 스스로 미량의 비료를 물에 희석시켜
땃에 공급합니다. 적당한 농도를 유지하고,
만드는 것 모두 스스로 합니다. 별도의 TDS농도
측정기를 구입하고, 적정 농도를 가이드북에서
찾아 관리할 수도 있습니다. 농도조절이 잘 되지 않는
경우 뿌리가 괴사하기 쉬우므로 많은 주의가 필요합니다.

물
물이 충분히 있는지 없는지 스스로 확인하여
물이 부족한 경우, 물을 부어 보충해주어야 합니다.
드레이클 열어 땃 내부를 확인하거나, 땃을 들어올려
무게로 물의 양을 가늠해 볼 수 있습니다.

리스크 관리
잎에 알 수 없는 얼룩이 생기거나, 뿌리가 괴사하는 등
리스크가 인지되는 경우, 스스로 문제 상황을 해결합니다.
문제를 파악하기 위해, 자료를 찾아보기도 합니다.
문제가 되는 부분을 빠르게 제거하여 대처하기도 하며,
때로는 포트 전체를 버려야 하는 경우도 있습니다.

빛
재배하는 식물이 충분한 빛을 받았는지 여부를
스스로 판단합니다. 빛이 부족하다 인지될 경우,
벌이 잘 드는 창가에 땃을 옮겨주거나, 별도의
재배용 조명을 설치하여 충분한 빛을 받아
잘 생장할 수 있도록 합니다.

수확하기
충분히 작물이 먹기좋게 자랐는지 스스로 보고
판단합니다. 잘자란 작물을 수확하기 위해
주변 다른 작물이 상하지 않도록 합니다.
수확 후, 수확물의 증량을 체거나 상태를 확인하고
재배가 잘 되었는지, 왜 잘되었는지 또는 왜 잘되지
않았는지 등을 나 스스로 파악하여 (어플 기록을 참고하여)
다음 파종에 반영합니다.

6

“제품이 식물에 물과 빛을 공급하고 어플리케이션에서 식물 재배 환경에 대한 정보를 보여줍니다.”

제공된 가이드 북과 재료를 가지고 충분히 재배를 이해한 뒤에 스스로 식물 재배를 합니다.
부족한 배경지식은 스스로 책이나, 인터넷, 지인 등을 충분히 활용하여 습득합니다.
식물을 키우는 환경에 대해 스스로 인지하고 필요한 부분을 채우기 위해 대처합니다.
식물의 상태를 스스로 인지하고, 물-빛-영양 등에 대해 스스로 대처합니다.
식물의 생육 환경에 대한 빛, 물, 온도 등의 정보는 어플리케이션 내에서 정량적으로 보여줍니다.
어플리케이션에서 제공하는 정량적인 데이터를 보고, 스스로 판단하여 식물에게 물, 빛, 영양 공급을 합니다.

제품 구성

생육에 필요한 빛 on/off기능이 있고, 환경 데이터를 보여주는 어플리케이션
수경재배 팟
씨앗이 들어있는 카트리지 - 영양분 미포함
재배 가이드 북
액상 비료

식물별 키우기 가이드 북
식물별로 키우기 가이드 큐알코드가 제공되어
씨앗 심기부터, 수확에 이르기까지 필요한
모든 정보가 담겨있습니다.

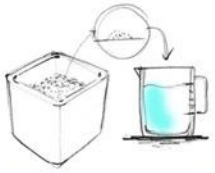
생장 단계별 체크리스트
생장 단계별로 주의해야할 사항을
체크리스트로 만들어 제공합니다.
가이드 북 내에 포함되어 있으며
각 체크리스트는 어플리케이션으로
간단히 확인 가능합니다.

또한 나의 재배 상황을 기록할 수 있습니다.

파종 방식
씨앗이 들어있는 인공 토양이 카트리지 형태로
포장되어, 원하는 작물별로 구입하여 제품에
꽂아 사용할 수 있습니다. 영양분은 포함되어 있지
않아, 별도로 영양분을 주어야 합니다.

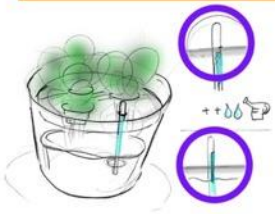
포트를 개봉하여 꽂아 파종하기
원하는 씨앗이 들어있는 포트를 개봉하여
팟에 꽂아 파종합니다.
팟에는 물을 충분히 담아 포트를 촉촉히 유지합니다.

빛
재배하는 식물이 충분한 빛을 받았는지 여부를
어플리케이션을 통해 알 수 있습니다.
하루 최소 8시간의 암전시간을 지키도록,
사용자 스스로 어플리케이션의 on/off버튼을 이용하여
조절할 수 있습니다.



영양
수경재배에서 부족하기 쉬운 영양분을 보충
하기 위해, 스스로 미량의 비료를 물에 희석시켜
팟에 공급합니다. 적당한 농도를 유지하고,
관드는 것 모두 스스로 합니다. 별도의 TDS농도
측정기를 구입하고, 적정 농도를 가이드북에서
찾아 관리할 수도 있습니다. 농도조절이 잘 되지 않는
경우 뿌리가 괴사하기 쉬우므로 많은 주의가 필요합니다.

리스크 관리
알에 알 수 없는 얼룩이 생기거나, 뿌리가 괴사하는 등
리스크가 인지되는 경우, 스스로 문제 상황을 해결합니다.
문제를 파악하기 위해, 자료를 찾아보기도 합니다.
문제가 되는 부분을 빠르게 제거하여 대처하기도 하며,
때로는 포트 전체를 버려야 하는 경우도 있습니다.

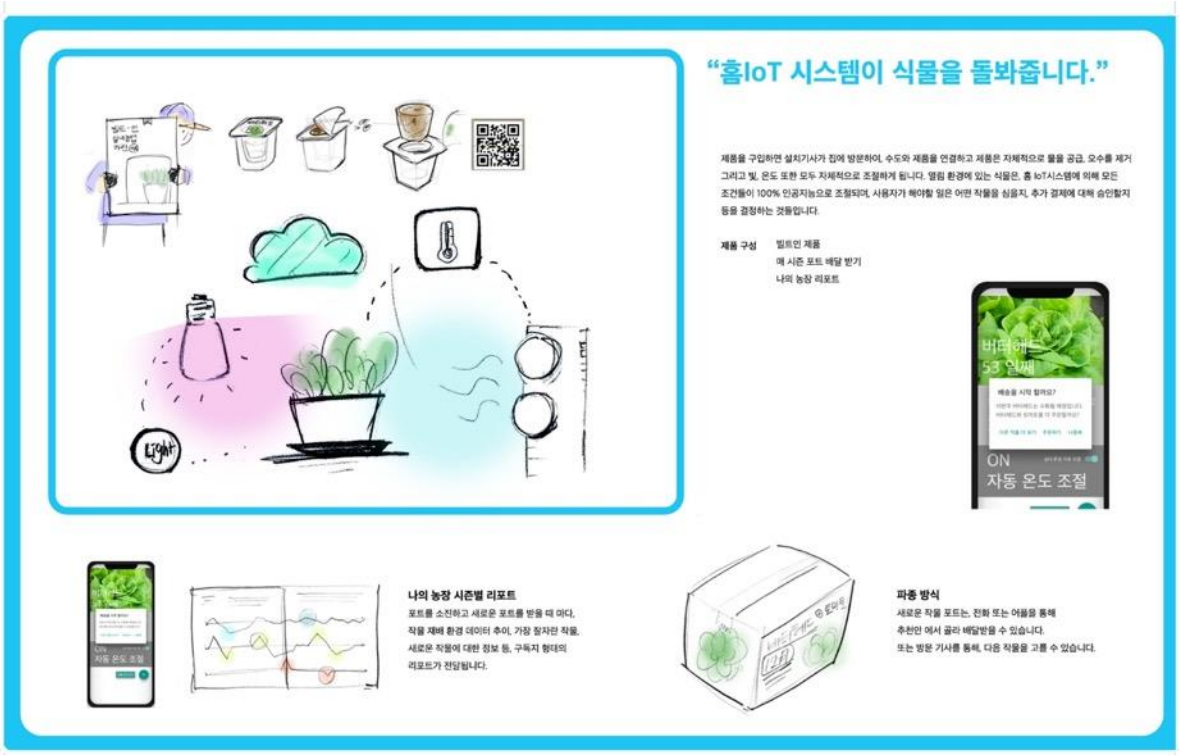


물
물이 충분히 있는지 없는지 스스로 확인하여
물이 부족한 경우, 물을 부어 보충해주어야 합니다.
트레이에 꽂혀있는 케이지 바를 통해, 물이 있나나
남아있는지, 트레이를 개봉하지 않고 알 수 있습니다.

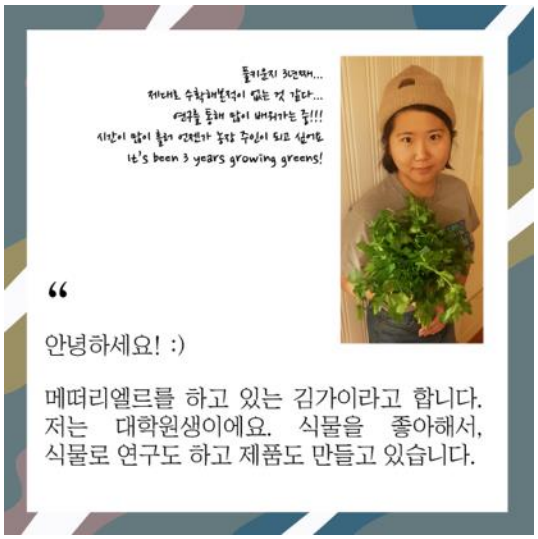
수확하기
충분히 작물이 억기좋게 자랐는지 스스로 보고
판단합니다. 잘자란 작물을 수확하기 위해
주변 다른 작물이 상하지 않도록 합니다.
수확 후, 수확물의 중량을 재거나 상태를 확인하고
재배기 잘 되었는지, 왜 잘되었는지 또는 왜 잘되지
않았는지 나 스스로 피악하여 (어플 기록을 참고하여)
다음 파종에 반영합니다

7

8

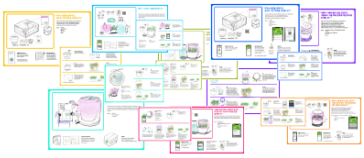


APPENDIX Recruiting posts



그리고, 현재 제가 만든 8가지 제품 시나리오를 보고 설문으로 느낀점을 점수매겨 주실 실내 텃밭 고수님들을 찾고 있어요!

그림과 글로 표현한 시나리오이고, 제품과 기술, 서비스를 묘사해 두었답니다.



그리고, 현재 제가 만든 8가지 제품 시나리오를 보고 설문으로 느낀점을 점수매겨 주실 실내 텃밭 고수님들을 찾고 있습니다!

And now I am looking for the indoor home farmers who are experienced and who can evaluate my 8 personal indoor scenarios with my prepare survey questions.

온-오프라인 모두 가능하고 스카이프, 카페, 자택 모두 가능하도록 준비되어있습니다. :) 시공간의 제약이 걱정되신다면 염려마세요! 가꾸고 계신 초록밭에 초대해주신다면 더욱 좋고요!! 시간은 30분에서 40분 정도 소요될 예정입니다. 그리고 참여한 모든 분께 1만원의 참여금을 드릴 예정이에요.

만약에 운이 좋으시다면 서른 분중 두 분께 드리는 메떠리엘르의 리네아 키트를 선물로 받으실 수도 있어요 :) (원하는 그림도 직접 그려드려요!)

댓글/DM 모두 좋습니다 ~
그럼 많은 참여 부탁드립니다!
읽어주셔서 감사합니다~:)

Thank you!

Please leave comments or direct message if you want to participate in this research. :-)

Appendix - Questionnaires

개인 실내 농업 경험 사용자 조사

안녕하세요! 반갑습니다.
유니스트 창의디자인 공학 석사과정에 재학중인 김가이입니다.
본 설문은, [개인 실내 농업 제품시스템에 관하여 - 자율화 정도에 따른 사용자-제품 애착 조사]를 위한 설문입니다.

다음 페이지 부터는, 8가지 개인 실내농업의 시나리오가 이어집니다.
각 시나리오를 보시고, 11개 문항에 대해 5가지 선택지 중에 답하여주십시오.

문의 사항은 담당자에게 언제든 문의주시기 바랍니다.
감사합니다.

[담당자 연락처]
김가이
010 - 6560- 3069
카카오 아이디: gili0522

* Required

질문을 시작하기 전에 알아야 할 7가지

안녕하세요! 질문에 응답하기에 앞서, 실내에서 식물을 키우기 위해 잘 해야할 7가지에 대해 설명해드리고자 합니다. 이미 경험이 있는 분들은 본래 알고 계신 것 보다 더 많을 수도 더 적을 수도 있으며, 경험이 많지 않은 분께는 생소한 부분이 있을 수도 있습니다. 잘 읽어보시고 실험 진행자에게 질의를 통해 충분히 이해하신 후, 질문 응답을 시작해주십시오. 감사합니다!

개인 실내 농업을 위한 7가지 필수 요소

아래 링크를 클릭하여 설명을 읽어주십시오.

https://www.slideshare.net/secret/x0OmY3Z2UUXukN

1. **읽기 완료 확인** *
Check all that apply.
- [ ] 읽었음

시나리오를 충분히 이해한 후, 질문에 답해주십시오. (1/8)

2. **시나리오 번호를 클릭해주세요.** *
Mark only one oval.

1	2	3	4	5	6	7	8
◯	◯	◯	◯	◯	◯	◯	◯

3. **이 시나리오의 제품을 사용하면 작물에 감정적으로 연결되는 기분일 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

4. **이 시나리오의 제품은 나에게 의미가 클 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

5. **이 시나리오의 제품은 나에게 중요한 사람들을 상기시켜 줄 것이다.**
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

6. **나는 이 시나리오의 제품에 대해 아무런 감정이 없을 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

7. **이 시나리오의 제품은 내가 누군지 보여줄 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

8. **이 시나리오의 제품은 특정한 삶의 방식을 대변한다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

9. **이 시나리오의 제품은 내 삶을 더 쉽게 만들것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

10. **이 시나리오의 제품은 매우 유용할 것이다.** *
발표 자료 및 사전에 읽은 자료 모두
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

11. **이 시나리오의 제품은 내가 힐링 되는 효과를 줄 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

12. **나는 이 시나리오의 제품을 즐거이 사용할 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

13. **이 시나리오의 제품은 비쌀 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

14. **이 시나리오의 제품은 매우 가치있을 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

시나리오를 충분히 이해한 후, 질문에 답해주십시오. (2/8)

15. **시나리오 번호를 클릭해주세요.** *
Mark only one oval.

1 2 3 4 5 6 7 8

16. **이 시나리오의 제품을 사용하면 작물에 감정적으로 연결되는 기분일 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.						매우 그렇다.

17. **이 시나리오의 제품은 나에게 의미가 클 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.						매우 그렇다.

18. **이 시나리오의 제품은 나에게 중요한 사람들을 상기시켜 줄 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.						매우 그렇다.

19. **나는 이 시나리오의 제품에 대해 아무런 감정이 없을 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.						매우 그렇다.

20. **이 시나리오의 제품은 내가 누군지 보여줄 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.						매우 그렇다.

21. **이 시나리오의 제품은 특정한 삶의 방식을 대변한다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.						매우 그렇다.

22. **이 시나리오의 제품은 내 삶을 더 쉽게 만들것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.						매우 그렇다.

23. **이 시나리오의 제품은 매우 유용할 것이다.** *
발표 자료 및 사전에 읽은 자료 모두
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.						매우 그렇다.

24. **이 시나리오의 제품은 내가 힐링 되는 효과를 줄 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.						매우 그렇다.

25. **나는 이 시나리오의 제품을 즐거이 사용할 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.						매우 그렇다.

26. **이 시나리오의 제품은 비쌀 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.						매우 그렇다.

27. **이 시나리오의 제품은 매우 가치있을 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.						매우 그렇다.

시나리오를 충분히 이해한 후, 질문에 답해주십시오. (3/8)

28. **시나리오 번호를 클릭해주세요.** *
Mark only one oval.

1 2 3 4 5 6 7 8

29. **이 시나리오의 제품을 사용하면 작물에 감정적으로 연결되는 기분일 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.						매우 그렇다.

30. **이 시나리오의 제품은 나에게 의미가 클 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.						매우 그렇다.

31. **이 시나리오의 제품은 나에게 중요한 사람들을 상기시켜 줄 것이다.**
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.						매우 그렇다.

32. **나는 이 시나리오의 제품에 대해 아무런 감정이 없을 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.						매우 그렇다.

33. **이 시나리오의 제품은 내가 누군지 보여줄 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.						매우 그렇다.

34. **이 시나리오의 제품은 특정한 삶의 방식을 대변한다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.						매우 그렇다.

35. **이 시나리오의 제품은 내 삶을 더 쉽게 만들것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

36. **이 시나리오의 제품은 매우 유용할 것이다.** *
발표 자료 및 사전에 읽은 자료 모두
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

37. **이 시나리오의 제품은 내가 힐링 되는 효과를 줄 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

38. **나는 이 시나리오의 제품을 즐거이 사용할 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

39. **이 시나리오의 제품은 비쌀 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

40. **이 시나리오의 제품은 매우 가치있을 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

시나리오를 충분히 이해한 후, 질문에 답해주십시오. (4/8)

41. **시나리오 번호를 클릭해주세요.** *
Mark only one oval.

1	2	3	4	5	6	7	8
◯	◯	◯	◯	◯	◯	◯	◯

42. **이 시나리오의 제품을 사용하면 작물에 감정적으로 연결되는 기분일 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

43. **이 시나리오의 제품은 나에게 의미가 클 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

44. **이 시나리오의 제품은 나에게 중요한 사람들을 상기시켜 줄 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

45. **나는 이 시나리오의 제품에 대해 아무런 감정이 없을 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

46. **이 시나리오의 제품은 내가 누군지 보여줄 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

47. **이 시나리오의 제품은 특정한 삶의 방식을 대변한다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

48. **이 시나리오의 제품은 내 삶을 더 쉽게 만들것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

49. **이 시나리오의 제품은 매우 유용할 것이다.** *
발표 자료 및 사전에 읽은 자료 모두
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

50. **이 시나리오의 제품은 내가 힐링 되는 효과를 줄 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

51. **나는 이 시나리오의 제품을 즐거이 사용할 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

52. **이 시나리오의 제품은 비쌀 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

53. **이 시나리오의 제품은 매우 가치있을 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

시나리오를 충분히 이해한 후, 질문에 답해주십시오. (5/8)

54. **시나리오 번호를 클릭해주세요.** *
Mark only one oval.

1	2	3	4	5	6	7	8
◯	◯	◯	◯	◯	◯	◯	◯

55. **이 시나리오의 제품을 사용하면 작물에 감정적으로 연결되는 기분일 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

56. **이 시나리오의 제품은 나에게 의미가 클 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

57. **이 시나리오의 제품은 나에게 중요한 사람들을 상기시켜 줄 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

58. **나는 이 시나리오의 제품에 대해 아무런 감정이 없을 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

59. **이 시나리오의 제품은 내가 누군지 보여줄 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

60. **이 시나리오의 제품은 특정한 삶의 방식을 대변한다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

61. **이 시나리오의 제품은 내 삶을 더 쉽게 만들것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

62. **이 시나리오의 제품은 매우 유용할 것이다.** *
발표 자료 및 사전에 읽은 자료 모두
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

63. **이 시나리오의 제품은 내가 힐링 되는 효과를 줄 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

64. **나는 이 시나리오의 제품을 즐거이 사용할 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

65. **이 시나리오의 제품은 비쌀 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

66. **이 시나리오의 제품은 매우 가치있을 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

시나리오를 충분히 이해한 후, 질문에 답해주십시오. (6/8)

67. **시나리오 번호를 클릭해주세요.** *
Mark only one oval.

1	2	3	4	5	6	7	8
◯	◯	◯	◯	◯	◯	◯	◯

68. **이 시나리오의 제품을 사용하면 작물에 감정적으로 연결되는 기분일 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

69. **이 시나리오의 제품은 나에게 의미가 클 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

70. **이 시나리오의 제품은 나에게 중요한 사람들을 상기시켜 줄 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

71. **나는 이 시나리오의 제품에 대해 아무런 감정이 없을 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

72. **이 시나리오의 제품은 내가 누군지 보여줄 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

73. **이 시나리오의 제품은 특정한 삶의 방식을 대변한다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

74. **이 시나리오의 제품은 내 삶을 더 쉽게 만들것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

75. **이 시나리오의 제품은 매우 유용할 것이다.** *
발표 자료 및 사전에 읽은 자료 모두
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

76. **이 시나리오의 제품은 내가 힐링 되는 효과를 줄 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

77. **나는 이 시나리오의 제품을 즐거이 사용할 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

78. **이 시나리오의 제품은 비쌀 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

79. **이 시나리오의 제품은 매우 가치있을 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

시나리오를 충분히 이해한 후, 질문에 답해주십시오. (7/8)

80. **시나리오 번호를 클릭해주세요.** *
Mark only one oval.

1	2	3	4	5	6	7	8
◯	◯	◯	◯	◯	◯	◯	◯

81. **이 시나리오의 제품을 사용하면 작물에 감정적으로 연결되는 기분일 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

82. **이 시나리오의 제품은 나에게 의미가 클 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

83. **이 시나리오의 제품은 나에게 중요한 사람들을 상기시켜 줄 것이다.**
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

84. **나는 이 시나리오의 제품에 대해 아무런 감정이 없을 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

85. **이 시나리오의 제품은 내가 누군지 보여줄 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

86. **이 시나리오의 제품은 특정한 삶의 방식을 대변한다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

87. **이 시나리오의 제품은 내 삶을 더 쉽게 만들것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

88. **이 시나리오의 제품은 매우 유용할 것이다.** *
발표 자료 및 사전에 읽은 자료 모두
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

89. **이 시나리오의 제품은 내가 힐링 되는 효과를 줄 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

90. **나는 이 시나리오의 제품을 즐거이 사용할 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

91. **이 시나리오의 제품은 비쌀 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

92. **이 시나리오의 제품은 매우 가치있을 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

시나리오를 충분히 이해한 후, 질문에 답해주십시오. (8/8)

93. **시나리오 번호를 클릭해주세요.** *
Mark only one oval.

1	2	3	4	5	6	7	8
◯	◯	◯	◯	◯	◯	◯	◯

94. **이 시나리오의 제품을 사용하면 작물에 감정적으로 연결되는 기분일 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

95. **이 시나리오의 제품은 나에게 의미가 클 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

96. **이 시나리오의 제품은 나에게 중요한 사람들을 상기시켜 줄 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

97. **나는 이 시나리오의 제품에 대해 아무런 감정이 없을 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

98. **이 시나리오의 제품은 내가 누군지 보여줄 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

99. **이 시나리오의 제품은 특정한 삶의 방식을 대변한다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

100. **이 시나리오의 제품은 내 삶을 더 쉽게 만들것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

101. **이 시나리오의 제품은 매우 유용할 것이다.** *
발표 자료 및 사전에 읽은 자료 모두
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

102. **이 시나리오의 제품은 내가 힐링 되는 효과를 줄 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

103. **나는 이 시나리오의 제품을 즐거이 사용할 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

104. **이 시나리오의 제품은 비쌀 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

105. **이 시나리오의 제품은 매우 가치있을 것이다.** *
Mark only one oval.

	1	2	3	4	5	
매우 그렇지 않다.	◯	◯	◯	◯	◯	매우 그렇다.

가장 사용하고 싶은 시나리오와, 가장 사용하지 않을 것 같은 시나리오를 골라주세요.

106. **가장 사용하고 싶은 제품/서비스 시나리오**
Mark only one oval.

1	2	3	4	5	6	7	8
◯	◯	◯	◯	◯	◯	◯	◯

107. **가장 사용하고 싶지 않은 제품/서비스 시나리오**
Mark only one oval.

1	2	3	4	5	6	7	8
◯	◯	◯	◯	◯	◯	◯	◯

당신의 실내 농업 경험에 대한 질문입니다.

108. **당신이 지내는 공간에서, 먹기 위한 식물을 기를 의향이 있습니까?** *
Mark only one oval.

- ◯ 네
- ◯ 아니오

109. **지금까지, 먹는 식물을 키워서 실제로 수확에 성공하여 섭취해보신 적이 있습니까?** *
Mark only one oval.

- ◯ 네
- ◯ 아니오

110. **실내에서 먹는 식물을 키우는 데에 얼마나 자주 시간을 할애할 수 있습니까?** *
Mark only one oval.

- ◯ 하루에 한 번
- ◯ 2-3일에 한 번
- ◯ 일주일에 한번
- ◯ 2주 - 3주에 한번
- ◯ 한 달에 한 번

개인 일반 정보에 대한 질문입니다.

*개인정보 (생년월일, 전화번호, 성명 등)에 대한 질문을 포함하지 않습니다.

111. **성별이 어떻게 되십니까?**
Mark only one oval.

- ◯ 남
- ◯ 여
- ◯ Other: _____

112. **태어난 해가 언제입니까? (네개 숫자로 응답해주십시오. 예를 들어, 1991)** *

_____

113. **국적을 기입해 주십시오.** *

_____

114. **직업을 기입해 주십시오.**

_____

115. **주거 형태를 선택해 주십시오.** *
Mark only one oval.

- ◯ 1개의 공간에 거주하는 원룸, 오피스텔
- ◯ 공동 주거 시설 (기숙사, 쉐어하우스)
- ◯ 2개 이상의 방이 있는 아파트, 연립주택
- ◯ 단독 주택
- ◯ Other: _____

116. **함께 거주하고 있는 사람의 숫자는 몇 명입니까?** *

_____

모든 설문에 응답하셨습니다. 감사합니다!

OVERALL PREFERENCE IN TERMS OF EMOTIONAL BONDING

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
S1EB	45	1.3333334	5.0000000	4.051851840	.8225224467
S2EB	45	1.6666666	5.0000000	3.503703711	.8750821823
S3EB	45	2.0000000	5.0000000	3.800000016	.8539864912
S4EB	45	1.0000000	5.0000000	2.392592593	.9081251885
S5EB	45	2.0000000	5.0000000	3.925925933	.7584170324
S6EB	45	2.0000000	5.0000000	3.585185191	.8231362620
S7EB	45	2.3333333	5.0000000	3.674074091	.7703104947
S8EB	45	1.0000000	4.3333335	2.444444436	.8071648903
Valid N (listwise)	45				

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
S1Memo	45	1	5	**3.47**	1.217
S2Memo	45	1	5	3.11	1.112
S3Memo	45	1	5	2.91	1.164
S4Memo	45	1	5	2.02	.941
S5Memo	45	1	5	**3.20**	1.120
S6Memo	45	1	5	2.98	1.076
S7Memo	45	1	5	2.89	1.229
S8Memo	44	1	4	2.09	.910
Valid N (listwise)	44				

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
S1SE	45	2.0	5.0	**3.822**	.8199
S2SE	45	1.5	5.0	3.433	.9330
S3SE	45	1.5	5.0	3.444	.8543
S4SE	45	1.0	5.0	3.333	1.1531
S5SE	45	1.0	5.0	**3.611**	1.0219
S6SE	45	2.0	5.0	3.444	.8134
S7SE	45	1.5	5.0	3.422	.8723
S8SE	45	1.0	5.0	3.411	1.1144
Valid N (listwise)	45				

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
S1U	45	1.0	4.0	2.178	.7917
S2U	45	1.5	5.0	3.144	.9022
S3U	45	2.0	5.0	3.889	.7825
S4U	45	1.5	5.0	4.167	.9943
S5U	45	1.0	5.0	2.889	1.0163
S6U	45	1.0	5.0	3.311	.8413
S7U	45	2.0	5.0	4.011	.7110
S8U	45	2.5	5.0	4.400	.6708
Valid N (listwise)	45				

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
	45	2	5	3.71	.968
S2LV	45	1	5	3.29	1.141
S3LV	45	2	5	3.71	.944
S4LV	45	1	5	2.51	1.160
S5LV	45	1	5	3.40	.963
S6LV	45	1	5	3.36	1.111
S7LV	45	1	5	3.53	1.014
S8LV	45	1	5	2.76	1.209
Valid N (listwise)	45				

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
S1E	45	1	5	3.20	1.100
S2E	45	1	5	3.33	1.044
S3E	45	2	5	3.87	.894
S4E	45	1	5	3.04	1.205
S5E	45	1	5	3.31	1.125
S6E	45	1	5	3.27	.889
S7E	45	2	5	3.89	.982
S8E	45	1	5	3.29	1.359
Valid N (listwise)	45				

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
S1MV	45	1.0	3.5	2.200	.6431
S2MV	45	2.0	5.0	3.156	.6727
S3MV	45	1.5	5.0	3.844	.7674
S4MV	45	2.5	5.0	4.178	.6670
S5MV	45	1.0	5.0	2.744	.9084
S6MV	45	1.0	4.5	3.211	.8222
S7MV	45	2.0	5.0	3.733	.6360
S8MV	45	3.0	5.0	4.311	.5466
Valid N (listwise)	45				

DIFFERENCE BETWEEN IN-EXPERIENCED AND EXPERIENCED IN TERMS OF EMOTIONAL BONDING

Group Statistics

	Exp/In-Exp	N	Mean	Std. Deviation	Std. Error Mean
S1EB	0	23	4.231884043	.6390869442	.1332588397
	1	22	3.863636355	.9576154621	.2041643025
S2EB	0	23	3.318840574	.9453675564	.1971227621
	1	22	3.696969718	.7691752897	.1639887228
S3EB	0	23	3.956521774	.7128286882	.1486350563
	1	22	3.636363632	.9699674782	.2067977612
S4EB	0	23	2.304347826	.8814189832	.1837885628
	1	22	2.484848486	.9468816723	.2018758508
S5EB	0	23	4.043478270	.6985146257	.1456503679
	1	22	3.803030309	.8142844455	.1736060271
S6EB	0	23	3.695652183	.7100508129	.1480558292
	1	22	3.469696973	.9295791261	.1981869356
S7EB	0	23	3.797101461	.6493130116	.1353911222
	1	22	3.545454568	.8761716883	.1868004316
S8EB	0	23	2.376811587	.9062317812	.1889623889
	1	22	2.515151505	.7031845491	.1499194496

Test Statistics[a]

	S1EB	S2EB	S3EB	S4EB	S5EB	S6EB	S7EB	S8EB
Mann-Whitney U	198.500	191.500	212.000	230.000	208.000	216.000	205.500	230.500
Wilcoxon W	451.500	467.500	465.000	506.000	461.000	469.000	458.500	506.500
Z	-1.252	-1.421	-.941	-.527	-1.035	-.852	-1.090	-.517
Asymp. Sig. (2-tailed)	.210	.155	.347	.598	.301	.394	.276	.605

a. Grouping Variable: Exp/In-Exp

DIFFERENCE BETWEEN IN-EXPERIENCED AND EXPERIENCED IN TERMS OF DETERMINANTS

Test Statistics[a]

	S1Memo	S2Memo	S3Memo	S4Memo	S5Memo	S6Memo	S7Memo	S8Memo
Mann-Whitney U	167.000	225.000	228.000	245.500	236.000	248.000	221.000	221.500
Wilcoxon W	420.000	501.000	504.000	498.500	512.000	501.000	497.000	452.500
Z	-2.016	-.666	-.591	-.182	-.399	-.119	-.747	-.501
Asymp. Sig. (2-tailed)	.044	.506	.554	.856	.690	.905	.455	.616

a. Grouping Variable: Exp/In-Exp

Test Statistics[a]

	S1SE	S2SE	S3SE	S4SE	S5SE	S6SE	S7SE	S8SE
Mann-Whitney U	241.500	230.500	225.500	246.000	228.500	216.000	240.000	240.000
Wilcoxon W	494.500	506.500	478.500	522.000	504.500	469.000	493.000	493.000
Z	-.268	-.517	-.638	-.161	-.565	-.854	-.300	-.298
Asymp. Sig. (2-tailed)	.789	.605	.523	.872	.572	.393	.764	.766

a. Grouping Variable: Exp/In-Exp

Test Statistics[a]

	S1U	S2U	S3U	S4U	S5U	S6U	S7U	S8U
Mann-Whitney U	245.500	216.500	224.500	229.000	227.500	219.500	243.000	211.000
Wilcoxon W	521.500	492.500	500.500	482.000	503.500	472.500	519.000	464.000
Z	-.173	-.841	-.661	-.565	-.586	-.780	-.235	-.999
Asymp. Sig. (2-tailed)	.862	.400	.509	.572	.558	.436	.814	.318

a. Grouping Variable: Exp/In-Exp

Test Statistics[a]

	S1LV	S2LV	S3LV	S4LV	S5LV	S6LV	S7LV	S8LV
Mann-Whitney U	218.500	245.000	209.000	249.000	244.000	252.500	238.000	220.000
Wilcoxon W	471.500	521.000	462.000	525.000	497.000	505.500	491.000	496.000
Z	-.834	-.188	-1.047	-.094	-.217	-.012	-.358	-.775
Asymp. Sig. (2-tailed)	.404	.851	.295	.925	.828	.990	.720	.438

a. Grouping Variable: Exp/In-Exp

Test Statistics[a]

	S1E	S2E	S3E	S4E	S5E	S6E	S7E	S8E
Mann-Whitney U	220.500	232.000	200.500	231.000	241.500	241.500	223.500	250.000
Wilcoxon W	473.500	485.000	453.500	507.000	494.500	494.500	476.500	526.000
Z	-.765	-.503	-1.274	-.514	-.270	-.281	-.703	-.070
Asymp. Sig. (2-tailed)	.444	.615	.203	.607	.787	.779	.482	.944

a. Grouping Variable: Exp/In-Exp

Test Statistics[a]

	S1MV	S2MV	S3MV	S4MV	S5MV	S6MV	S7MV	S8MV
Mann-Whitney U	169.500	226.000	232.000	249.000	245.000	252.000	245.500	242.000
Wilcoxon W	422.500	502.000	485.000	502.000	498.000	505.000	498.500	495.000
Z	-1.946	-.632	-.489	-.093	-.186	-.023	-.177	-.261
Asymp. Sig. (2-tailed)	.052	.528	.625	.926	.852	.982	.860	.794

a. Grouping Variable: Exp/In-Exp

DETERMINANTS INFLUENCING EMOTIONAL BONDING

Correlations

		S1EB	S1Memo	S1SE	S1U	S1LV	S1E	S1MV
S1EB	Pearson Correlation	1	.482**	.345*	-.049	.390**	.516**	.295*
	Sig. (2-tailed)		.001	.020	.747	.008	.000	.049
	N	45	45	45	45	45	45	45
S1Memo	Pearson Correlation	.482**	1	.392**	-.265	.194	.200	.226
	Sig. (2-tailed)	.001		.008	.079	.201	.187	.135
	N	45	45	45	45	45	45	45
S1SE	Pearson Correlation	.345*	.392**	1	.041	.335*	.469**	.166
	Sig. (2-tailed)	.020	.008		.789	.025	.001	.276
	N	45	45	45	45	45	45	45
S1U	Pearson Correlation	-.049	-.265	.041	1	.143	.258	.275
	Sig. (2-tailed)	.747	.079	.789		.350	.086	.068
	N	45	45	45	45	45	45	45
S1LV	Pearson Correlation	.390**	.194	.335*	.143	1	.675**	.551**
	Sig. (2-tailed)	.008	.201	.025	.350		.000	.000
	N	45	45	45	45	45	45	45
S1E	Pearson Correlation	.516**	.200	.469**	.258	.675**	1	.424**
	Sig. (2-tailed)	.000	.187	.001	.086	.000		.004
	N	45	45	45	45	45	45	45
S1MV	Pearson Correlation	.295*	.226	.166	.275	.551**	.424**	1
	Sig. (2-tailed)	.049	.135	.276	.068	.000	.004	
	N	45	45	45	45	45	45	45

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

IN-EXPERIENCED GROUP AND DETERMINANT INFLUENCING S1

Correlations

		S1EB	S1Memo	S1SE	S1U	S1LV	S1E	S1MV
S1EB	Pearson Correlation	1	.317	.418*	.252	.526**	.582**	.408
	Sig. (2-tailed)		.140	.047	.246	.010	.004	.053
	N	23	23	23	23	23	23	23
S1Memo	Pearson Correlation	.317	1	.412	-.097	.061	-.030	.067
	Sig. (2-tailed)	.140		.051	.659	.780	.891	.761
	N	23	23	23	23	23	23	23
S1SE	Pearson Correlation	.418*	.412	1	.244	.481*	.599**	.236
	Sig. (2-tailed)	.047	.051		.261	.020	.003	.278
	N	23	23	23	23	23	23	23
S1U	Pearson Correlation	.252	-.097	.244	1	.366	.401	.346
	Sig. (2-tailed)	.246	.659	.261		.085	.058	.105
	N	23	23	23	23	23	23	23
S1LV	Pearson Correlation	.526**	.061	.481*	.366	1	.687**	.602**
	Sig. (2-tailed)	.010	.780	.020	.085		.000	.002
	N	23	23	23	23	23	23	23
S1E	Pearson Correlation	.582**	-.030	.599**	.401	.687**	1	.580**
	Sig. (2-tailed)	.004	.891	.003	.058	.000		.004
	N	23	23	23	23	23	23	23
S1MV	Pearson Correlation	.408	.067	.236	.346	.602**	.580**	1
	Sig. (2-tailed)	.053	.761	.278	.105	.002	.004	
	N	23	23	23	23	23	23	23

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

EXPERIENCED GROUP AND DETERMINANT INFLUENCING S1

Correlations

		S1EB	S1Memo	S1SE	S1U	S1LV	S1E	S1MV
S1EB	Pearson Correlation	1	.518*	.300	-.273	.285	.480*	.142
	Sig. (2-tailed)		.014	.174	.218	.199	.024	.528
	N	22	22	22	22	22	22	22
S1Memo	Pearson Correlation	.518*	1	.386	-.438*	.247	.370	.238
	Sig. (2-tailed)	.014		.076	.042	.268	.090	.287
	N	22	22	22	22	22	22	22
S1SE	Pearson Correlation	.300	.386	1	-.198	.175	.306	.060
	Sig. (2-tailed)	.174	.076		.376	.436	.166	.790
	N	22	22	22	22	22	22	22
S1U	Pearson Correlation	-.273	-.438*	-.198	1	-.083	.094	.217
	Sig. (2-tailed)	.218	.042	.376		.715	.678	.332
	N	22	22	22	22	22	22	22
S1LV	Pearson Correlation	.285	.247	.175	-.083	1	.658**	.483*
	Sig. (2-tailed)	.199	.268	.436	.715		.001	.023
	N	22	22	22	22	22	22	22
S1E	Pearson Correlation	.480*	.370	.306	.094	.658**	1	.218
	Sig. (2-tailed)	.024	.090	.166	.678	.001		.331
	N	22	22	22	22	22	22	22
S1MV	Pearson Correlation	.142	.238	.060	.217	.483*	.218	1
	Sig. (2-tailed)	.528	.287	.790	.332	.023	.331	
	N	22	22	22	22	22	22	22

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).